IN THE SUPREME COURT OF INDIA

CIVIL APPELATE JURISDICTION

PETITION FOR SPECIAL LEAVE TO APPEAL CC NO. 292 / 2009

IN THE MATTER OF:

STATE OF GUJARAT AND ANOTHER - PETITIONERS

Vs.

ALOK PRATAP SINGH AND OTHERS - RESPONDENTS

AFFIDAVIT ON BEHALF OF THE BHOPAL GROUP FOR INFORMATION AND ACTION, BHOPAL GAS PEEDIT MAHILA STATIONARY KARAMCHARI SANGH & BHOPAL GAS PEEDIT MAHILA PURUSH SANGHARSH MORCHA

I, Satinath Sarangi, s/o Late Shri Phani Bhushan Sarangi, c/o 44, Sant Kanwar Ram Nagar, Berasia Road, Bhopal -462 018 sc hereby solemnly affirm and state as under:-

1. That I am a Member of the Bhopal Group for Information and Action, intervener in the instant matter, and as such I am conversant to the facts and circumstances of the case and competent to swear this affidavit.

2. This affidavit is being filed by the Interveners in response to submissions of the Union of India - in the present matter as well as Special Leave Petition (Civil) No. 21936 of 2008 - that the hazardous toxic waste left by Union Carbide at its factory site in Bhopal be disposed off in the incinerator of M/s

Bharuch Enviro Infrastructure Limited (BEIL) at Ankleshwar in Gujarat or the incinerator currently under construction by M/s Ramky Enviro- Engineers Ltd in Pithampur in Madhya Pradesh. The Interveners respectfully submit that neither of the incinerators is prepared to receive the toxic waste at this time as the incinerator at Ankleshwar does not have the capacity to dispose of additional waste and the incinerator at Pithampur has not been constructed as yet. Further, M/s Ramky Enviro-Engineers Ltd. Does not have current certification from the Central Pollution Control Board. Indeed disposal of the toxic waste in the abovementioned facilities is likely to cause serious health hazards during transportation of the waste, to the workers involved and to people living in areas around the incinerator sites.

3. It is submitted that in June 2005 M/s Ramky Pharma City [Ltd] which is part of Ramky group of companies was involved with the containment and storage of surface waste in Union Carbide, Bhopal factory premises. The lack of proper planning, monitoring equipment and non compliance of Hazardous Waste Management & Handling Rules, 1989 and the consequent health injuries and hospitalization caused to neighborhood communities has been reported in newspapers. It has also drawn criticism from the Chairman of the Local Area Environmental Committee which is part of the Supreme Court Monitoring Committee on Hazardous Waste.

A true copy of a Pioneer Newspaper news report on health hazards caused by the transportation of toxic waste by M/s Ramky Ltd and dated 26.6.2005 is attached herewith as **Annexure A-1**.

4. It is respectfully submitted that the Ramky group of companies have a negative reputation in waste management throughout the country. Their dismal record in Hyderabad, Andra Pradesh, Taloja Maharashtra, Gummidipoondi,Tamil Nadu and Pithampur, Madhya Pradesh is evident from the criticisms by government scientific agencies, regulatory authorities and non government agencies. Their violations of safety regulations include unsafe locations in Gummidipoondi and Pithampur and most recently there has been an fire in their Hyderabad facility.

A chart setting out the safety violations of M/s Ramky Enviro Engineering Ltd in toxic waste disposal facility locations throughout the country is attached herewith as **Annexure A-2**.

5. It is submitted further that it has been recognised by the Union of India on a prior occasion that in the absence of suitable technological facilities with proven track record in India it is appropriate to dispose of such toxic hazardous waste in an overseas facility, as this route was adopted in the case of disposal of toxic mercury containing waste from the Hindustan Lever

Limited, mercury thermometer factory at Kodaikanal, Tamilnadu, in 2003.

6. It is respectfully submitted that the Madhya Pradesh High Court erred in its assumption that the decision to incinerate 350 MT Union Carbide waste at Ankleshwar, Gujarat was based on the recommendations of the Technical Sub Committee. The said technical Sub Committee is constituted of scientists appointed to make specialist recommendations for safe disposal of the hazardous toxic waste to the Task Force set up by the Hon'ble High Court of Madhya Pradesh.

7. It is respectfully submitted that the statement by the Union of India that the "toxicity of the 350 MT of waste is not so high and does not pose any kind of danger at the place of incineration" is without any scientific basis and is not a finding of the Technical Sub Committee.

INCINERATION AT ANKLESHWAR, GUJARAT

8. On 10th Oct 07 Government of Gujarat withdrew its no objection for one time incineration of 350 Union Carbide waste at Ankleshwar, Gujarat. As of now Gujarat Government has not given permission to incinerate Bhopal waste so the question of sending 350 MT to Gujarat for incineration does not arise.

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9. In light of recent correspondence from concerned agencies it is not correct to say that BEIL at Ankleshwar is ready to receive and incinerate the 350 MT toxic waste of UCIL. As per the letter written by Chairman of M/s Bharuch Enviro Infrastructure Limited incineration on 1st Feb 2009 to the Secretary, Ministry of Chemicals & Fertilizers states that there is 11000 tones of waste at BEIL to be disposed on behalf of its member industries and in addition to this waste there is another 4000 tones of waste lying in the factory. At present BEIL has capacity to incinerate 1250 tonnes/month and at this rate it will take at least a year to incinerate 15000 tones. It will be difficult for BEIL to take further waste from outside the industries for incineration.

A true copy of the abovementioned letter dated 1.2.2009 (attached with affidavit filed by the Union of India in March 2009 in the tagged matter SLP No. 21936 of 2008) is attached herewith as **Annexure A-3.**

10. Indeed BEIL has already expressed its lack of "readiness" and critical remarks about its technology have been made by experts.

A true copy of the report of GTZ, a German Development Enterprise supported by the government of Germany comparing the BEIL incinerator to an incinerator which meets standards of health, safety and environmental protection is attached herewith as **Annexure A-4**

INCINERATION AT PITHAMPUR, MADHYA PRADESH

11. On 24th Jan 08, the Central Pollution Control Board (CPCB) inspected the Madhya Pradesh Waste Management Project at Pithampur, Dhar and reported that no progress was made regarding storing of wastes that spillages were seen inside the storage sheds. The designs of cell or landfill were not approved by MPPCB. No precautionary measures were taken regarding location of Solar Evaporation Ponds and construction of bunds. Incinerable waste has been collected without permission of MPPCB. Most significantly the CPCB found that a village called Tarapur with a population of over 500 is located within 500 m from the plant boundary, which is a violation of CPCB guidelines under the Environment Protection Act, 1986. In view of the above findings and the permanent nature of the violation of the EPA Act 1986, it is submitted that the decision to dispose Union Carbide waste at Pithampur needs to be seriously re examined.

12. Indeed as per the inspection carried out by CPCB officials at Pithampur facility on 4th Feb 09 the following violations were found.

- No consent to dispose off waste in the water

- No consent to dispose off waste in the air

13. Further, the incinerator at Pithampur does not have any authorization to operate from the Madhya Pradesh Pollution Control Board (MPPCB)

14. Despite these serious lacunae, 1136.32 MT of incinerable waste has been collected for transportation to the incinerator at Pithampur. This included 55.125 MT of waste received by the incinerator during April 2008-Jan 2009 for

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landfilling that was diverted for incineration purpose after finger print analysis. The said waste is likely to include 40 MT of Union Carbide waste that was transported, violating several sections of Hazardous Waste Management Rules, 1989 to Pithampur in June 2008. Thus the CPCB also found that the operator of the facility has violated two major directions "Installation of Multi Effect Evaporator followed by Spray Dryer for treatment of leachate by 31.12.08 and not to procure incinerable hazardous waste till the incinerator is commissioned."

15. Further the CPCB has entered a finding that its storage guidelines were not being followed and that smoke detectors installed in the sheds were not working. It is respectfully submitted that given the poor record of M/s Ramky Enviro Engineering Ltd. in the country and the dismal status of the waste Pithampur, the waste should not be sent for incineration.

16. In May 2008, the Ministry of Environment and Forests issued directions u/s5 of the Environment protection Act 1986, to Ramky Enviro Engineers Ltd. wherein they were issued notice to show cause why action shall not be taken to:

> " i) Close the Unit for collection, reception, treatment, storage and disposal of hazardous wastes with immediate effect;
>
> ii) To direct the concerned authorities to disconnect the supply of electricity and water to your facility"

The status report of the CPCB regarding their visit on 4.2.2009 makes clear that the Ramky, Pithampur facility is still not competent to receive the waste, infact the status report says :

> "It was observed that the Operator has violated two major directions – installation of Multi effect Evaporator followed by Spray Dryer for treatment of leachate by 31.12.2008 and not to procure incinerable hazardous waste till the incinerator is commissioned."

True copies of a status report regarding implementation of CPCB's directions as of the abovementioned direction dated 2.5.2008, a Direction u/s5 of the Environment Protection Act by the CPCB to the Madhya Pradesh waste Management project of Ramky Enviro Engineers Ltd. are attached herewith as **Annexure A-5COLLY .**

17. Thus it is respectfully submitted that the facility at Ankleshwar is not ready to receive the Union Carbide waste for incineration. The inherent dangers in the construction of the Pithampur TSDF facility are stated above. The successful completion of the Pithampur project of M/s Ramky Enviro Engineers Limited is very much in doubt, given the unsafe location of the facility and the lack of necessary consents from state and central regulatory bodies.

18. Approx. 350 MT of the hazardous toxic waste has been packaged in containers; the remaining 8,000 - 10,000 MT of toxic hazardous waste is seeping into the groundwater and this water is being drunk daily by 30,000 people in 14 affected areas

including in Atal Ayub Nagar, Arif Nagar, Blue Moon Colony, Gareeb nagar etc. as clean water is still not being supplied by the Stsate government of Madhya Pradesh. Indeed the area of contamination is expanding and more and more people exposed to severe health risks.

19. It is respectfully submitted therefore that given the lack of readiness of the BEIL facility at Ankleshwar and the lack of compliance to regulatory guidelines in the Pithampur facility reinforces the view of the interveners that facilities for safe disposal of hazardous wastes do not exist in this country and the safe disposal of 350 MT (as well as other toxic waste lying underground) exists only in OECD countries. This is in line with the consensus of the Technical Sub Committee that as the first option, the Union Carbide toxic waste should be exported for safe disposal. The absence of safe incinerators to dispose of such toxic waste has also been recognised by the Union of India. In 2003 Hindustan Lever Limited was required to arrange transport of hazardous toxic waste containing mercury from Kodaikanal , Tamin Nadu to Pennsylvania in the United States for safe disposal. In accordance with the "polluter pays" regulation of the Hazardous Waste Management Rules 1989, HLL bore the cost of safe transportation of the hazardous toxic waste to the United States and disposal in properly equipped and certified facility.

INTERNATIONAL FACILITIES CERTIFIED FOR SAFE DISPOSAL OF TOXIC WASTE

20. As such it is respectfully submitted that the below toxic waste disposal units - or other such environmental, health and safety regulations compliant facilities -are recommended.

A. **GTZ, Eschborn, Frankfurt, Germany**

GTZ is active worldwide in over 120 countries in Africa, Asia, Latin America. the facility is already involved in an Indo-German collaboration with the Union of India for over 40 years which includes the hazardous toxic waste management, dealing with obsolete pesticides and environmental policy.

Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ) GmbH
Dag-Hammarskjöld-Weg 1-5
65760 Eschborn
Telephone +49 6196 79-0
Telefax +49 6196 79-1115

Postal address
Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ) GmbH
Postfach 5180
65726 Eschborn

Ekokem OY AB, Helsinki Finland
owned by the Finland Govt. 34.1%
ISO

B. **Ekokem Oy Ab, Helsinki, Finland**

- Owned by the Finnish government (34.1%), municipalities (28.2%) and industry (37.7%)

- ISO 9001, ISO 14001, EMAS, OHSAS 18001 and other key certifications

- More than 20 years of experience.

- Can take care of project planning, collection, packaging, labelling, transportation and the final disposal of the waste.

- Processing is centred at the Riihimäki plant some 70 km north from Helsinki. The plant utilises, renders harmless or safely.

- disposes off some 120,000 tons of hazardous waste every year. The plant processes hazardous organic chemical waste, contaminated soil, inorganic hazardous waste and other industrial wastes.

- The company has much experience of disposing of obsolete pesticides from agricultral countries

- The incineration of waste takes place in the kilns at a temperature of about 1300 °C with an oxygen surplus of at least 6 % in the kiln and its after-burning chamber. This ensures complete incineration.

- The Finnish Funding Agency for Technology and Innovation and Finpro are planning with their co-partners to set up an innovation centre in India, the intention being to make the Finnish innovation system well-known and increase joint innovation activities between Finland and India

EKOKEM OY AB
P.O. Box 181
FI-11101 Riihimäki, Finland
Tel. +358 10 7551 000
Fax +358 10 7551 300
www.ekokem.fi

C. **Earth Tech, Alberta, Canada**

- Swan Hills Treatment Centre owned by the government of Alberta and operated by Earth Tech Canada Inc

- More than 20 years of experience.

- The destruction and removal efficiency rate of the Swan Hills Treatment Centre exceeds the licensed requirement for DRE of 99.9999% for organic materials, typically operating at a DRE level of 99.999999%. It has been used to destroy dioxins and PCBs.

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- The facility is networked with waste management service providers for onsite jobs such as waste collection, waste labeling/packaging, documentation or transportation of hazardous wastes.

- Certified ISO 14001 OHSAS 18001

- Earth Tech Canada has over 8,400 professional and support personnel in 150 offices worldwide, including the U.S., Canada, Mexico, South America, Europe, Australia, and Asia/Pacific.

EARTH TECH (CANADA) INCORPORATED
105 COMMERCE VALLEY DRIVE W
THORNHILL, ON L3T 7W3
http://www.shte.ca/

21. It is submitted therefore that the only way to dispose off the toxic waste in accordance with the Environmental Protection Act 1986 and the Hazardous Waste Management Rules 1989 is to export the waste to an appropriate facility as recognised by the Union of India on previous occasions and recommended by the Technical Sub Committee. It is stated further that the successors of interest of Union Carbide are liable to pay

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for disposal of Union Carbide toxic waste .

DEPONENT

Satinath Sarangi
Member
Bhopal Group for Information and Action

VERIFICATION

I, the above named deponent do hereby verify that the facts stated in the above affidavit are true to my knowledge based on record and nothing material has been concealed there from.

Verified at New Delhi on the day of April, 2009.

DEPONENT

Satinath Sarangi

Member

Bhopal Group for Information and Action

Berasia Road, Bhopal

Carbide clean-up another toxic mess

Dinesh C Sharma

Bhopal, June 26, 2005

The cleaning up of toxic waste at the closed Union Carbide plant here, launched last week by state agencies, has thrown the 'polluter pays' principle to the wind, sending a clear signal to multinational corporations to 'pollute and escape, the tax payer will pay up for your mess'.

Though the MP government says it will extract the cost of the clean-up from Dow Chemicals – present owners of Union Carbide – the fact is that the Jabalpur High Court issued the clean-up order after hearing Dow's refusal to bear any liability or be dragged into the case.

FLAWS

- It negates position taken by India in US court that in keeping with 'polluter pays' principle, Union Carbide should bear clean-up cost
- The operation wasn't scientifically planned
- Unscientific cleaning has led to fresh health hazards to nearby communities

In stage one of the operation – dubbed "second gassing of Bhopal" by activists as it led to fresh spreading of toxic dust to neighbouring communities – 370 tons of waste containing Sevin pesticide and residues, stockpiles of BHC, soil and lime contaminated by different chemicals was picked up from the factory and stored in a renovated shed. This waste is to be moved to a secured landfill for permanent burial, in the next stage.

The state's plan is fraught with disastrous legal, environmental and scientific consequences.

First, it negates the position taken by the Indian government in the US court hearing liability litigation. In a no objection letter to the US District Court in June 2004, India had said that in keeping with the 'polluter pays' principle, Union Carbide should bear the financial burden.

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"It will make the governments of India and MP appear not only inconsistent but ridiculous in the eyes of the US courts and other who have been following this case," says H. Rajan Sharma, lead counsel in federal class action against Union Carbide on behalf of Bhopal survivors and pollution-hit communities. He said that if it is a temporary operation, governments should specifically tell the US court that these measures have been taken, pending a comprehensive environmental remediation that should be paid for and undertaken by Union Carbide.

Second, the operation wasn't scientifically planned. Officials of Ramky, the Hyderabad firm hired for the initial clean up, said their brief was limited to "collecting the waste, packing it, transporting it to the shed, labeling it and stacking it up".

"We tested all the material and labeled them accordingly. The only thing we didn't test was reactor residue from the main plant as we were told to clean this up at the last moment," said K.S.M. Rao, MD, Ramky. The reactor in the plant has corroded over the years and a lot of unreacted mass is lying around it.

Asked if the shed housing the waste is monsoon-proof – because the logic behind the deadline fixed by the court was to prevent run-off during the rains – he said: "I can't guarantee that because the state PWD got the shed ready for us. It has some broken window panes."

Third, unscientific cleaning has led to fresh health hazards to communities around. "I visited several areas like Arif Nagar, Annu Nagar, Bluemoon Colony, JP Nagar on two days and found there was a strong stench, people were being exposed to air-borne pollutants – possibly benzene hexachloride and other chemicals – coming from the factory," said Satish Tewari, chairman of the Local Area Environmental Committee, an arm of the Supreme Court Monitoring Committee on Hazardous Waste.

Several national and international studies have pointed out that soil, groundwater, buildings and structures in the factory are contaminated. A scientific remediation plan

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should cover treatment of chemical stockpiles, buildings and other structures as well as treatment of contaminated soil.

This process could take several years and cost billions of dollars.

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Dismal record of TSDF facilities of Ramky Enviro Engineering Ltd.

S.No	Ramky Facility	Location	Date	Comments	Reference
1	Ramky Enviro Engineer TSDF Facility	Taloja, Maharashtra	June 2005	Community Environmental Monitoring Group Chennai found 9 toxic chemicals in the air sampling of the TSDF facility	Smokescreen Publication
2	Ramky Enviro Engineer TSDF Facility	Gummidipoondi, Tamil Nadu	Mar 2005	Site not suitable for TSDF	NEERI, Nagpur
3	Ramky TSDF Kazhipally Industrial Estate Hyderabad	Hyderabad, Andhra Pradesh	18 Jan 2009	Massive fire at the TSDF facility. 8 fire engines could not stop the fire	The Hindu Newspaper, 18th Jan 2009
4	Ramky TSDF Facility M.P. Waste Management Project Division	Pithampur, Madhya Pradesh	Feb 2009	Site built within 500 m of a village and several other violations	CPCB, Delhi

Annexure A3 19

BHARUCH ENVIRO INFRASTUCTURE LTD.

REGD OFFICE, 117, GIDC, ANKLESHWAR – 393 022, DIST. BHARUCH,

GUJARAT

PHONE (02646) 51252 / 51223 / 51249 FAX (02646) 50297

February 1, 2009

The Secretary

Ministry of Chemicals & Fertilizers,

Government of India,

New Delhi

Dear Sir,

Sub : **RE-INCINERATION OF BHOPAL WASTE**

Further to my correspondence about incineration of 350 Tones of Bhopal waste, I would like to inform you that in Gujarat we have large quantities of incinerable waste with the member industries, and at present, they being enlisted members, we have to give overriding priority to our members who have large volumes of hazardous wastes lying in their factory. The estimated wastes is around 10,000 to 11,000 tones which has been verified with BPCB and under the circumstances we may not be able to accept any new wastes till this accumulation is not exhausted. We are also having around 4000 tones of waste which is lying in our factory.

At present we have the capacity of incinerating of about 1250 tones/month and at this rate it will take at least about a year or so to incinerate about 15000 tones. Within this period of 12 months' time again there would be generation of about

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12000 tones of waste in the member industries. So, it will be difficult for us to take further waste from outside the industries for incineration. If the accumulated waste with the industries is not taken care of by us, then there would be a situation in which large numbers of member industries would have to be closed down for not taking care of hazardous waste as per the provisions of Hazardous Waste Rules.

In view of this, I request you to kindly consider the above issues and appreciate the present state of rising wastes in the State.

Kind regards,

Yours sincerely,

[SIGNATURE]

Rjju Shroff

TRUE COPY

ANNEXURE A-21

HAWA - Hazardous Waste Management Project Karnataka

Indo-German Technical Cooperation

ASEM Advisory Services in Environmental Management

Karnataka State
Pollution Control Board

German Technical Cooperation
Deutsche Gesellschaft fur Technische
Zusammenarbeit (GTZ) GmbH

KSPCB - ERM GmbH

Project Office Bangalore

Dr Jurgen Porst (Senior Advisor)

22nd Floor, Public Utility Building

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Comparison of

TSDFs in India and Germany

Regarding Suitability for Incineration of Pesticides

Author:

Dr Eckart Schultes

HIM GmbH

Germany

HAWA Short-term Expert

February/March 2007

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Comparison of TSDFs in India and Germany regarding Suitability for Incineration of Pesticides

Background

An Indian High Court (HC) is about to decide on the disposal of waste material of an abundant chemical plant. The relevant State Government has spent considerable amounts of funds on packaging, testing and retesting of waste material through various institutes. However the complete chemical characteristics may not be fully known. The State Government approached the Central Government to provide funds for transport, incineration and disposal of 200 to 400 MT of hazardous chemical and toxic waste including Sevin and Napthol residues and semi-processed pesticides from this factory to Ankleshwar in Gujarat.

Objective of this Investigation

To compare incinerators, disposal sites, facilities and procedures for hazardous and toxic wastes in India and Germany from technical and ecological points of view and to elaborate an assessment on the differences in equipment and environmental management of incinerators and repositories for disposal of incineration residues.

Methodology

The comparison of the Treatment Storage and Disposal Facilities (TSDFs) is elaborated according to technical, environmental and economic criteria. To enable a comprehensible overview the comparison is presented in form of a synoptical table providing the relevant criteria, brief descriptions, comments and valuation. Additional information and illustration are attached as annexes.

In order to focus the comparison on criteria which will be essential for a decision on the final disposal of the pesticide, concrete disposal facilities has to be considered as respective reference facility for the state of the practice of pesticide incineration in India and Germany.

Comparison of TSDFs in India and Germany regarding Suitability for Incineration of Pesticides

The criteria are to address all steps and measures of the planned disposal of the pesticides, which may be different for the disposal in the Indian reference facilities from the disposal in the German reference facilities.

Reference Incineration Facilities

In India there are three common TSDFs with rotary kiln hazardous waste incinerators known to the author which were recently installed according to current environmental protection standards of India. Nominal capacity of each incinerator is about 1 to 2 MT/h. These are:

- one at BEIL company in Ankleshwar, Gujarat
- one at Mumbai Waste Management Ltd. company at Taloja, Maharashtra
- one at the Hyderabad Waste Management Project of RAMKY company at Hyderabad, Andhra Pradesh

According the above background the BEIL incinerator at Ankleshwar serves as the Indian reference incineration facility in the comparison.

In Germany 35 rotary kilns are commercially operated for hazardous waste incineration with a total capacity of about 1.5 Mio MT/a. 26 of the kilns provide an individual capacity of more than 4 MT/h, 6 kilns are operated at capacities of more than 7 MT/h or more. Most of them were set-up in the 1970/80ties, few of them later. All of them are operated according to the stringent German and European environmental standards, especially those for hazardous waste incineration.

The well known Biebesheim incineration plant of HIM stands for a typical example of German common hazardous waste incinerators. Commercial operations started in 1982, since then more than 1.6 Mio MT of hazardous waste have been incinerated at Biebesheim. The two rotary kilns are operated at capacity of 7 - 8 MT/h. HIM's incineration plant at Biebesheim therefore serves as the German reference incineration

facility for the comparison. It can be used a typical representative example for all the other incinerators Germany

Reference Landfill for Incinerator Residues

The residues (slag, fly ash, off gas filter dust and additives etc.) from the Indian reference incinerator at Ankleshwar are disposed of at BEIL's propriety hazardous waste landfill at Ankleshwar, which therefore has to serve as the Indian reference landfill for the disposal of the incineration residues.

No residues from the German reference incinerator at Biebesheim are disposed of at an above ground landfill (like the one in Ankleshwar). Fly ash and bag house filter additives are internally reworked. Only slag, off gas filter dust and dried salts are discharged from the plant, shipped by silo trucks to an underground waste repository and disposed of in deep geologically stable salt layers by backfilling specially permitted and controlled abandoned salt mine caverns.

The Indian reference landfill for the disposal of the incineration residues therefore is compared with a German above ground landfill facility, which is permitted to accept all hazardous waste according to the German landfill regulations (DepV). HIM's hazardous waste landfill facility at Billigheim has been selected to serve as the German reference landfill facility for the comparison.

Comprehensive assessment of differences

The rotary kiln incinerator technology is widely used for the destruction of pesticide residues. The technological core part i.e. rotary kiln and secondary combustion chamber at the BEIL incinerator at Ankleshwar and at the HIM incinerators at Biebesheim are comparable in respect to design and operation conditions. Thermal destruction of pesticides shall be similar, in general.

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Comparison of TSDFs in India and Germany regarding Suitability for Incineration of Pesticides

The *major differences* from process point of view between the Ankleshwar incinerator and Biebesheim incinerator are *size and capacity*. At Biebesheim drums up to 200 l can be fed directly to the kiln without further pre-treatment. Incinerators of a small capacity like the one in Ankleshwar require small feed batches (< 30kg plastic drums), otherwise operation and thermal destruction are disturbed. In large units like at Biebesheim thermal destruction can be achieved and guaranteed much easier. Peak loads by drum feed are levelled out by other waste fed in parallel. Small incinerators like the one at Ankleshwar will be sensitive regarding thermal peak loads and fluctuating substantial heavy metal load (in particular mercury). Thermal peak loads and inhomogeneous waste feed cause gaseous emission peaks which frequently are exceeding the (half hourly) permit limit values. In case of mercury, such emission peaks can not be noticed at Ankleshwar because mercury is not continuously monitored as it is in Biebesheim.

At best, mercury may be trapped in the flue gas cleaning residues (bag house filter dust and additives) and then be disposed of on the Ankleshwar landfill. The residues are dust-like material and highly leachable. They are loaded with trace organic compounds and with salts and inorganic compounds like heavy metals which were volatilised during combustion. They are not suitable for landfill disposal according to German landfill acceptance criteria for mechanical stability and leach resistance. However, at Ankleshwar there is no further treatment of the leachable residues such as immobilization technology or solidification. The flue gas cleaning residues from the German Biebesheim incinerator are disposed of underground in specially permitted and controlled German salt mine caverns and exclude from biosphere in deep geologically stable salt layers.

Regarding practice experiences of the operators, routine and trouble shooting in handling and treating all types of waste, plant operation hours and treated waste quantities there is a substantial advantage for the Biebesheim incineration plant due

to the more than two decade successful operation. Halogenated pesticides have been treated and incinerated from all over Germany, from European countries and from over sea countries like Qatar and Venezuela.

Assuming the halogenated pesticides to have

- an average Cl content between 1% and 10% and
- an Hg content of < 100 mg/kg on average and a maximum Hg content of 100 g/drum

the total costs for transportation of 200 – 400 MT from an Indian sea port to Biebesheim and for incineration including final disposal of incineration residues are estimated to be about 3,00,000 to 6,00,000 Euros, which is about Rs. 1.5 to 3 crores.

Recommendation in respect to treatment and disposal of halogenated pesticides and potentially mercury containing waste of unknown composition

The disposal of the pesticide waste shall follow a comprehensive concept which has to take into account occupational safety and environmental protection aspects of the total process from safeguarding the material at the source to final disposal of incineration residues. It is recommended to include in detail the acceptance conditions of the disposal companies before starting any packaging or transportation activities. Due to the HSE risks hands-on handling of the waste shall be avcided as far as possible. In particularly at the incineration site direct feed to the incinerator without unpacking, repacking or intermediate storage is recommended.

Organic-chlorinated pesticides shall be kept separate from mercury waste as far as possible. Mercury containing waste is a problem for each incinerator. The only long-term safe disposal option for mercury waste is *an underground repository* in deep geologically stable salt layers.

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Comparison of TSDFs in India and Germany regarding Suitability for Incineration of Pesticides

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No	Criteria	India	Ger.
1	**Receptacles, Packaging and Transportation of Pesticide Material** The pesticide material is supposed to be packed on site in plastic or metal canisters or drums. Pesticide material in damaged containers, if feasible, must be repacked on site at source in suitable transport container. Otherwise the damaged containers must be put into a suitable over-pack transportation container. For safe and efficient handling by forklifts the transport container should be fixed on standard pallets (e.g. canister, drums) or provide respective pockets (e.g. IBC). For shipment to off site disposal the transport container has to meet the national regulations for transportation of dangerous goods.		

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	Ankleshwar, India: Transportation of pallets or container with pesticide material to off-site disposal in India is assumed to be on road by platform trucks. Biebesheim, Germany: For shipment to off site disposal in Germany the transport container has to meet furthermore the international regulations for transportation of dangerous goods on road and/or railway, and on sea (e.g. ADR/RID etc.). The pallets or containers with pesticide material are placed into ISO Standard Sea Container on site at the place of origin, which provides an additional containment compared to common transportation in India. Risk of accident during transportation increases with number of transhipments. Additional risk of loss by sea transportation.		+ -
2	**Approval to Hazardous Waste Transportation and Disposal (Manifest/Notification) and Control of Execution (Move-**		

	ment/Tracking Form) In India: Approval and control of disposal are according to the national regulations for transportation and disposal of hazardous waste in India. In Germany: Approval and control of disposal are additionally checked by German authorities according to the national regulations for transportation and disposal of hazardous waste and according to international regulations for transfrontier movements of hazardous waste considering environmental standards of disposal, proximity principle etc.		+
3	**Staff Qualification and Experience on Receipt, Characterisation, Handling of Pesticide Material at the Disposal Facility** Qualification and training of personnel in handling toxic material is assumed to be comparable in both reference facilities.		

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	Biebesheim, Germany: Practice experiences in characterisation and handling of toxic material to be incinerated as well as in managing emergency situations are gathered at Biebesheim for more than 25 years. Comparable experiences with toxic material to be incinerated may be gained at the Ankleshwar incinerator for few years only. However, experts experienced in handling of toxic material may be provided by the UPL facilities at Ankleshwar, it is assumed.		+
4	**Technical Equipment and HSE Measures of Pesticide Material Handling Area and Interim Storage** At Biebesheim, Germany all areas and facilities where receptacles with pesticide materials are handled, sampled, characterised,		

	stored and placed at disposal for incineration provide **(Fig. 2 – Fig. 5)** • roofing to protect against rainwater and sun shine • sealed ground floor with controllable double liner (resistant against chlorinated hydrocarbons) or steel liner • fire detectors, stationary and mobile fire extinguisher • hydrant system for fire fighting water • on-site fire brigade • separated areas for waste material of different class of hazard each with separate leakage collectors and sumps • identification, tracking and book keeping of waste material pallets by computed controlled barcodes • a total interim storage capacity for about 5,000 200 Litre-drums with max. 1,000 MT waste material		

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	• additionally interim storage for solid bulk waste in cassettes of about 550 cbm • additionally interim storage for liquid sludge bulk waste in tank farms of about 2,200 cbm capacity • receipt, handling, on-site movements and storage of receptacles with pesticide waste fixed on pallets only • on-site movements of receptacles with pesticide by forklift only, no hands-on movements. Ankleshwar, India is supposed to provide suitable HSE equipment and measures according to Indian regulations. According to the knowledge of the author the facility provide • roofing to protect against rainwater and sun shine • concrete ground floor with circumferential high point • hydrant system for fire fighting water		

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Comparison of TSDFs in India and Germany regarding Suitability for Incineration of Pesticides

	• no fire detectors in storage areas • no on-site fire brigade • identification, tracking and book keeping of waste material on hand written records • most of the waste received at Ankleshwar is shipped in drums • drums larger than 60 l must be manually emptied and repacked in plastic bags due to the small capacity of the incinerator • total interim storage capacity of several thousand MT of waste material		
5	**Repacking of Pesticide Material** *Biebesheim, Germany*: Large rotary kiln incinerators like the one in Biebesheim are capable to incinerate drummed waste in plastic		

3\c

	and steel drums up to a size of 200 l or 55 gallons. Drummed pesticide waste is commonly fed into the kiln in 60 L - 100 L drums. For high calorific or mercury containing material there are additional limitations in weight (e.g.30 kg). Ankleshwar, India: Due to the smaller thermal capacity of incinerators like the one at Ankleshwar limitation of feed batched in size and weight are even more stringent to avoid unstable combustion and emission peaks. Pesticide waste shipped in receptacles larger than 60 l has to be repacked in smaller ones for incineration in Ankleshwar. However, due to the smaller kiln the necessary scope of repacking, the number of small receptacle to be handled and the related HSE risks at Ankleshwar will generally higher than in Biebesheim.		
6	**Pesticide Waste Feed into Rotary Kiln**		

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Comparison of TSDFs in India and Germany regarding Suitability for Incineration of Pesticides

	Biebesheim, Germany: Drummed waste is fed into the rotary kilns by remotely operated drum conveyors, drum lifts and drum double door locks. Receptacles with pesticide waste are transferred from the storage areas to the drum feed area by forklifts and on pallets. Hands-on operation of single receptacles is limited to positioning receptacles on the remotely operated drum feed conveyors at the drum feed area only. Ankleshwar: Waste receptacles with a maximum size of 60l can be fed to the kiln. The receptacles are manually placed on the solid waste slope lift conveyor and pushed into the solid waste chute and fed into the kiln by the piston feeder. Due to small capacity of the plant more hands-on handling of receptacles with pesticide waste is supposed with the related higher HSE risks.	
7	**Destruction Efficiency of Persistent Organic Pollutants**	

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3/e

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	Both incinerators, at Ankleshwar as well as at Biebesheim are designed to provide sufficient destruction efficiency for persistent organic compounds under their "normal operation" design conditions regarding parameters like waste feed composition, waste feed rate, thermal waste load, combustion air demand and combustion temperature. However, deviations from the design range of "normal operation" conditions may directly cause insufficient destruction efficiency. The capability to control and maintain the above parameter within the design range of "normal operation" strongly depends on the practice experience of the operators and on the size and thermal capacity of the incinerator. **Scope of incineration practise experience** Biebesheim, Germany: Practice experiences of the operators are gathered at Biebesheim for more than 25 years of commercial operation with average waste throughputs from 30,000 MT/a in the beginning and about 60,000 MT/a since a couple of years. In		

	total more than 1.6 Mio MT of hazardous waste have been incinerated by HIM's operators since 1982. Among this amount there are waste pesticides from all over Germany, from European countries and from over sea countries like Qatar and Venezuela. Ankleshwar, India: The operators at Ankleshwar gained practice experience from about 2 years commissioning and operation. The accumulated amount of incinerated hazardous waste is not known to the author. But it is obvious that the incinerator is not operated on a daily and weekly (24/7) basis. **Size and thermal capacity of the incinerator** Biebesheim: • length of rotary kilns ~ 11m, inner diameter ~ 3,5m • volume of rotary kilns ~ 110 cbm		++

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	• kiln operation temperature about 1.200 °C • gas temperature in secondary combustion chamber ≥ 1.050°C • rotary kiln thermal capacity about 70 GJ/h Ankleshwar: • length of rotary kiln approx. 8 m, diameter approx. 2,5 m • volume of rotary kiln approx. 40 cbm • kiln operation temperature >850°C • gas temperature in secondary combustion chamber ≥ 1.100°C • total thermal capacity of rotary kiln and secondary combustion chamber about 25 GJ/h		+++

31 - H -

8	**Energy Recovery** Biebesheim: By federal regulation all waste incinerators in Germany have principally to recover heat from waste incineration. As shown in the principal design drawing of the Biebesheim incinerators (**Fig. 6**) both incinerators are equipped with heat recovery boilers and generate process steam which is used on-site for operating the incineration plant and for powering a propriety thermal emulsion separation and recovery plant. The oil/water mixtures are separated by evaporation. The oil fraction is recovered for using as substitute fuel and the distillates substitute fresh water for process water supply. Excess energy from waste incineration powers a turbo generator with an electrical power capacity of 4.3 MW. Electrical power is used for plant operation and excess en-		+

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31-5.

wet flue gas scrubbers and to collect and discharge the dried salt dust from the bleeds.

- a two-segment high efficient electrostatic precipitator for dust removal
- a 4-stage packed bed wet scrubber with quench, acid scrubber, caustic scrubber, venturi scrubber and demister
- a bag house filter with injection of lime and activated carbon powder for trace organic and inorganic compound removal
- induced draft fan and 75 m high stack.

Ankleshwar: The flue gas cleaning compass (see **Fig. 7**):

- injection of dry lime powder for flue gas acid removal
- injection of activated carbon for trace organic and inorganic compound removal
- dust removal by filter bags (bag house)

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31-K-

	• packed bed wet scrubber with demister for flue gas polishing (caustic soda scrubber) • induced draft fan and stack Comment: • Both incinerators, at Ankleshwar as well as at Biebesheim are designed to provide sufficient destruction efficiency for persistent organic compounds under their "normal operation" design conditions regarding parameters like waste feed composition, waste feed rate, thermal waste load, combustion air demand and combustion temperature. However, deviations from the design range of "normal operation" conditions may directly cause insufficient destruction efficiency. • Unforeseen deviations from "normal operation" behaviour occur quite frequently in routine operation due to undetected non-		

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	homogeneities of waste feed menu, in particular when feeding high calorific waste in drums. • The capability to control and maintain the above parameter within the design range of "normal operation" strongly depends on the practice experience of the operators and on the size and thermal capacity of the incinerator as described above in criteria No. 7. • Due to the different dimensions and capacities of the incinerators (7-8 MT/h instead of 1-2 MT/h) the Biebesheim incinerator reacts much more tolerant on undetected non-homogeneities in the waste feed.		+
10	**Airborne Emissions** Both incinerators, at Ankleshwar as well as at Biebesheim are permitted to be operated according to national standards as shown		

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	in **Fig. 8 and Fig. 9.** • Concerning the emissions of carbon monoxide, heavy metals and Dioxins/Furans the standards in India and Germany are nearly the same. • For emissions of total organic carbon, dust, acidic gases and NOx the Indian standard provides half hourly permit limits only, however no daily average permit limit values. • Assuming the Ankleshwar incinerator to be permitted without limiting daily averages of the continuously monitored emissions, the emissions of total organic carbon and NOx at Ankleshwar may exceed the German permit limit value by a factor of 2 and emissions of dust and acidic gases by factors of 4 and 5.		

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	• The actual airborne emissions from the Biebesheim hazardous waste incinerators are listed in **Fig. 10 and Fig. 11**.		
11	**Slag and Ash Quality and Disposal** Ash and slag quality refers to an undisturbed slag discharge from the rotary kiln, a small residual organic content of ash or slag and to a long-term leach resistance of ash and slag to be disposed of on aboveground landfills. Similar to the destruction efficiency of POP's described in criteria No. 7 the quality of ash and slag is strongly influenced by parameters like waste feed composition, waste feed rates, thermal waste loads and combustion temperatures. The capability of the operators to control and maintain these parameters within a suitable range strongly depends on the practice experience of the operators and on the size and thermal capacity of the incinerator.		

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	Biebesheim: HIM's incinerators are operated in the so-called slagging mode. Slagging mode means that the inert fraction of waste is burned-out and melted on during combustion and discharged as melted slag from the kiln into the wet slagger. • Slag from the Biebesheim incinerators is routinely sampled and analysed and has proved to have residual organic content ≤ 1% and high leach resistance concerning the pollutants imbedded in the slag. • Although slag and ash from waste incinerators are assigned to hazardous waste according to German waste list, the slag from the Biebesheim incinerators is qualified to be disposed of non-hazardous waste landfills or to be reprocessed for use as construction material, e.g. for sub-base construction. • Due to HIM's corporate environmental governance no residues from the Biebesheim incinerator are disposed of above ground. Slag is disposed of underground off-site in deep geologically stable salt layers by backfilling specially permitted and controlled		+

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	abandoned salt mine caverns. Ankleshwar: BEIL's incinerator is normally operated in a so-called ashing mode. The inert fraction of waste is burned-out, but not melted on during combustion and discharged as ash from the kiln into the wet slagger. • The ash from the incinerator is disposed of without further treatment at BEIL's hazardous waste landfill Ankleshwar. • The ash is assumed to be routinely checked for keeping the acceptance criteria at the landfill, e. g. residual organic content and leachability of pollutants.		
12	**Disposal of Fly ash and Residues and Effluents from Flue Gas Cleaning** Biebesheim:		

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	• Fly ash from the steam generation boilers are discharged into closed container, transferred into the solid bulk waste cassettes, fed back to the kiln again and imbedded into the slag with the above mentioned high leach resistance. • Fly ash and dried salts from the spray drier and residual fly ash and dust from the electrostatic filters are together discharged into a closed silo and transported in closed silo trucks to off-site underground disposed in deep geologically stable salt layers by backfilling specially permitted and controlled abandoned salt mine caverns. No hands-on operation is required. • There are no liquid effluents from the flue gas scrubbers. The bleeds from the scrubbers are neutralised and injected into the spray drier for evaporation. There the solved salts from the flue gas scrubbers are dried and removed from the flue gas. The dry salt dusts are discharged together with the dust from the electrostatic filters and disposed of underground as described above. • Spent lime and activated carbon powder from the bag house filters with trace organic and inorganic compounds are remotely		+ +

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	discharged into 200 l plastic lined paperboard drums without any hands-on operation. The spent lime and activated carbon powder drums are transferred via drum conveyor and lift into the kilns for incineration. By recycling to incineration residual trace organic compounds are destroyed and dioxins/furans, which may be regenerated in the flue gas by so-called "denovo" synthesis during cooling in the boiler, are completely decomposed without any residues to be disposed of. Ankleshwar: Fly ash, dusts and bag house additives discharged from the bag house filter into transfer container. The residues are loaded with trace organic compounds and with salts and inorganic compounds like heavy metals which were volatilised during combustion. The dusts-like residues are disposed of without further treatment or solidification at BEIL's hazardous waste landfill Ankleshwar. • The above residues are dust-like material, mechanically unstable and highly leachable. They are not suitable for landfill disposal	–	+

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Comparison of TSDFs in India and Germany regarding Suitability for Incineration of Pesticides

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	according to German landfill acceptance criteria regarding dust emission, mechanical stability and leach resistance. • Handling, transport and landfilling of the dusty material bears considerable HSE risks. • Avoidance of dust emission during handling and landfilling as well as suitable stability may be achieved in future by mechanical stabilisation prior to disposal. • However, even by a future cementation the long-term leach resistance of the above residues does not meet German above ground landfill practise and requirements. • The bleed from caustic scrubber with solved salts and residual inorganic pollutants like heavy metals is transferred to BEIL's CETP at Ankleshwar and treated by neutralisation, precipitation of pollutants and filtration. Filter residues are assumed to be disposed at the Ankleshwar landfill; filtrates with neutral salts are released together with the CETP effluent.	–	

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Comparison of TSDFs in India and Germany regarding Suitability for Incineration of Pesticides

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13	**Landfill** Billigheim: Referring to the above, no residues from the incinerator at Biebesheim are disposed of at an above ground landfill. The Ankleshwar landfill for the disposal of the incineration residues therefore is compared with HIM's hazardous waste landfill facility at Billigheim. The landfill facility is permitted to accept all hazardous waste types according to the German landfill regulations (DepV) and to the European landfill directive. Exemplary photographs of the Billigheim landfill are shown in **Fig. 12 to Fig. 17**. Ankleshwar: The residues (ash, fly ash, off gas filter dust and additives) from the at Ankleshwar incinerator are disposed of at BEIL's propriety hazardous waste landfill at Ankleshwar. • The facility of about 19 acres is set-up according current national and international standards • National Productivity Council (NPC), New Delhi, was consultant for implementation and operation of the facility.		

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Comparison of TSDFs in India and Germany regarding Suitability for Incineration of Pesticides

31-U

	• German experts with NPC have given guidance to develop the first of its kind facility in India. • The first landfill lots provide asphalt concrete lining and adequate leachate collection system. • The lining systems of the following landfill lots provide multi-barrier combination liner with mineral base barrier, HDPE geo-membrane, geo-textile and gravel layer. • Leachate is collected and transferred to BEIL's CETP at Ankleshwar for treatment and disposal. • During monsoon period open parts of the landfill are temporarily covered to minimise leachate generation and waste to be land-filled is stored in temporary storage. • The surface covering system of finally filled landfill lots compasses compacted clay liner, gas drainage system, 1.5 mm thick HDPE liner, drainage layer and 1 meter thick soil cover.		

31-V

	• BEIL holds valid authorization for collection and disposal of hazardous waste as per waste acceptance criteria. • The hazardous waste is transported to the site along with manifest as per the provisions of Hazardous Waste (Management and Handling) Rules, Amendment 2003.		
14	**Disposal Costs** The budget for the final disposal of 200 – 400 MT of halogenated pesticides (partly of unknown composition and potentially mercury containing) is said to be about Rs. 4 crores which is about 800,000 Euros. Disposal in India: The author has no proper knowledge of current transport and disposal costs for the said pesticides in India, they vary from company to company and from State to State. However, minimum price for the disposal of 1 ton of hazardous waste will		

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	be around Rs. 1,200 without any treatment. Thermal treatment (incineration) will cause much higher cost than landfilling alone. It is said that some companies are asking for minimum Rs 15,000 per ton of hazardous waste. Disposal in Germany at Biebesheim: The estimate of transport and disposal costs for the said pesticides from an Indian sea port to incineration at Biebesheim and final underground disposal of incineration residues is as follows: • Transport per ISO-Container with drummed pesticides on pallets from an Indian sea port to Biebesheim: ~ 450 Euro/MT • Total disposal costs at Biebesheim for pesticides with Cl < 1% on average: ~ 850 Euro/MT • Total disposal costs at Biebesheim for pesticides with Cl < 10% on average: ~ 975 Euro/MT • Total disposal costs at Biebesheim for pesticides with Cl < 60% on average: ~ 1600 Euro/MT • Total disposal costs for pesticides with Cl < 1% on average		

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	and with Hg < 100 mg/kg on average and max. 100 g Hg/drum: ~ 950 Euro/MT Assuming an average Cl content between 1% and 10%, an Hg content of < 100 mg/kg on average and a maximum Hg content of 100 g/drum, the costs of incineration at Biebesheim are estimated to be about 900 – 1,000 Euro/MT. Together with transportation from an Indian sea port the estimate is about 1,300 – 1,500 Euro/MT. The estimate for the transport from India to Biebesheim and for incineration and final disposal of 200 - 400 MT of halogenated pesticides sums up to an total of about 300,000 to 600,000 Euro which together with safeguarding and transportation in India is well within the above budget.		
15	**Exports of Hazardous Waste from India to Germany**		

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The shipment of hazardous waste from India to Germany comes under the regulations of the Basel Convention as well as the European Council Regulation (EEC) No 259/93 of 1 February 1993 on the supervision and control of shipments of waste within, into and out of the European Community. Both countries have ratified the Basel Convention. Every waste shipment has to be authorised by the competent authorities in India, Germany and possible transit countries. Respective Article 19 and Article 20 of the EC Regulation No 259/93 are quoted in FIG. **18 and 19**.

For this procedure certain forms have to be used. At first the notification document has to be filled in by the waste producer by giving information inter alias about waste characteristics, amount etc (**Fig. 20**). Then all competent authorities have to give their approval. For transparency purposes every single transport has to be accompanied by a certain movement document according to the Basel Convention (**Fig. 21**).

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	There is a lot of experience in applying this procedure at German hazardous waste management companies like HIM in Biebesheim and at their competent authorities, because there are many examples of taking such wastes from countries nearly all over the world. They are also able to give support in this field, e.g. in filling in the forms.		

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Comparison of TSDFs in India and Germany regarding Suitability for Incineration of Pesticides

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List of Annexes:

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Fig. 1: Hazardous Waste Incineration Plant of HIM at Biebesheim (2 x 60,000 MT/a)

Fig. 2: Unloading of toxic waste in one-way receptacles on pallets at Biebesheim

Fig. 3: Interim storage of toxic waste in one-way receptacles on pallets at Biebesheim

Fig. 4: Interim storage of hazardous waste in cardboard boxes on pallets at Biebesheim

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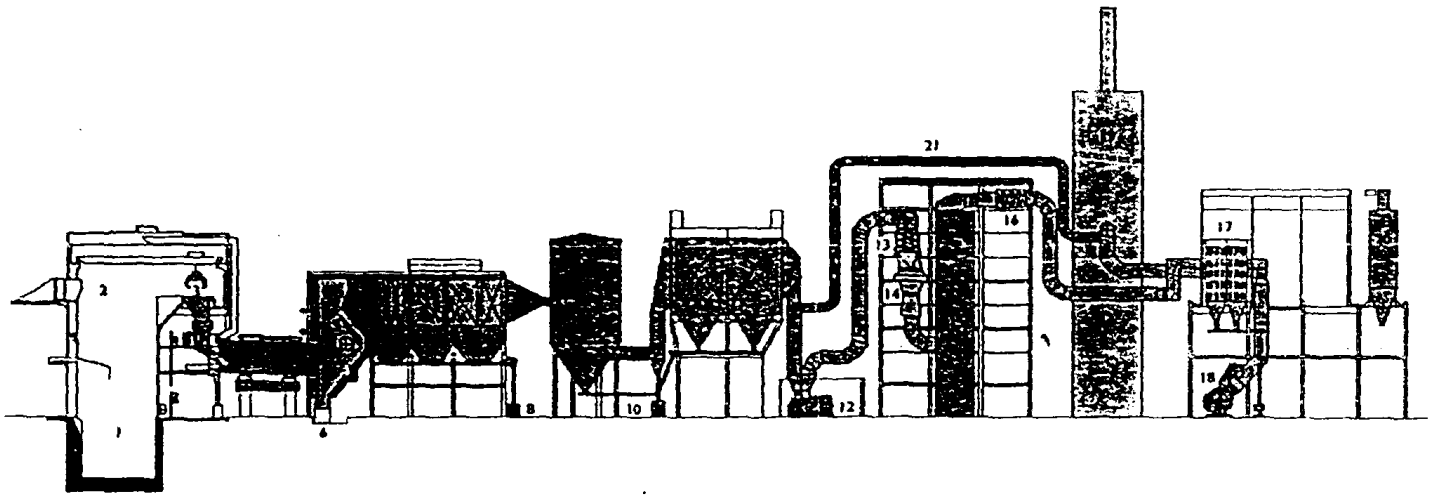
Fig. 14: Sampling / Waste Identification at HIM's Hazardous Waste Landfill at Billigheim

Fig. 15: Waste Deposition at HIM's Hazardous Waste Landfill at Billigheim

Fig. 16: Cleaning of Tires and Truck after Waste Deposition at Billigheim Landfill

Fig. 17: Temporary Cover and Inspection/Maintenance Flange of Leachate Collector at Billigheim

31-ff



1 waste bunker
2 charging level
3 drum elevator
4 rotary kiln
5 afterburn chamber
6 slag cooler and outlet
7 boiler
8 boiler ash outlet
9 spray dryer
10 dust and salt outlet
11 electrostatic filter
12 suction draught
13 heat exchanger
14 quencher
15 scrubbing tower
16 heat exchanger
17 bag filter
18 suction draught
19 chimneystack
20 additiv silo
21 safety outlet (bypass)

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Comparison of TSDFs in India and Germany regarding Suitability for Incineration of Pesticides

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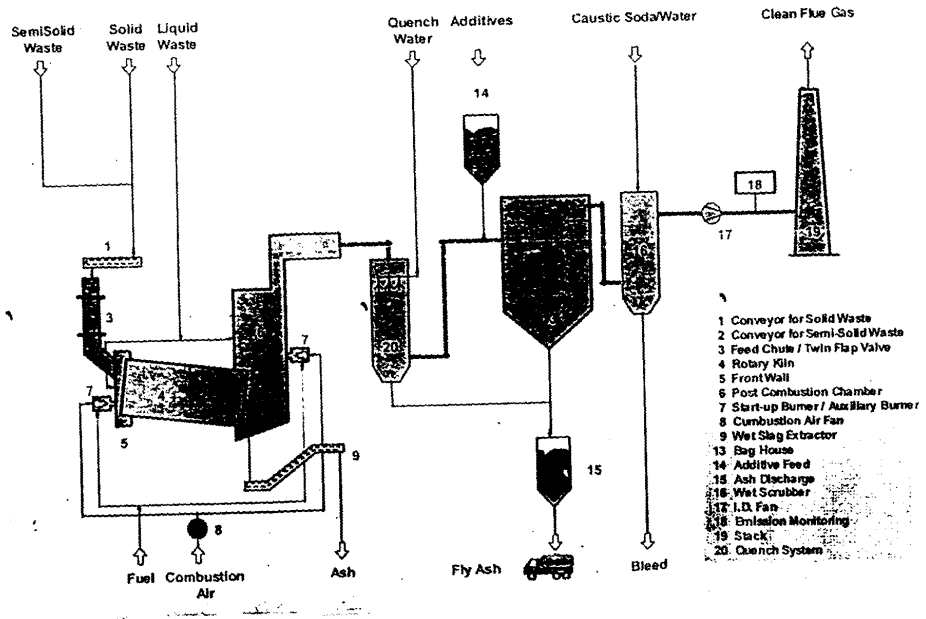

31-44

Fig.7 Simplified PFD of Ankleshwar Hazardous waste incinerator Plant C1

Parameter	Permit Limit (mg/Nm^3)	India	Germany
Dust	half hourly average value	50	30
	daily average value	---	10
CO	half hourly average value	100	100
	daily average value	50	50
HCl	half hourly average value	50	60
	daily average value	---	10
SO_2	half hourly average value	200	200
	daily average value	---	50
HF	half hourly average value	4	4
	daily average value	---	1
Corg. total	half hourly average value	20	20
	daily average value	---	10
NO_x	half hourly average value	400	400
	daily average value	---	200
Hg	half hourly average value	---	0,05
	daily average value	---	0,03

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Fig. 8: Continuously Monitored Emission Permit Limit Values for Hazard-

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Parameter		India	Germany
Hg and its compounds	mg/Nm3	0,05	0,05
Cd + Tl and their compounds	mg/Nm3	0,05	0,05
Sb and its compounds	mg/Nm3	0,05 (0,5 - 8 hours sampling)	0,5 (0,5 -2-hours sampling)
As and its compounds			
Pb and its compounds			
Cr and its compounds			
Co and its compounds			
Cu and its compounds			
Mn and its compounds			
Ni and its compounds			
V and its compounds			
Sn and its compounds	mg/Nm3	---	0,5 0,5 -2-hours sampling
As and its compounds			
Benzopyrene			
Cd and its compounds			
Co and its compounds			
Cr(VI) and its compounds except BaCrO4 and PbCrO4			
Total dioxins and furans (TEQ)	ng/Nm3	0,1 (6-8 hours sampling)	0,1 (6-8 hours sampling)

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Fig. 9: Discontinuously Monitored Emission Permit Limits for Hazardous Waste Incinerators

Parameter	Permit Limit (17. BImSchV) mg/Nm^3	Measured Average mg/Nm^3	Annual Emission kg/y
Dust	10	0,001 - 0,003	0,5 - 1,5
CO	50	10 - 25	5.200 - 13.000
HCl	10	< 0,5	< 260
SO_2	50	< 5	< 2.600
HF	1	< 0,1	< 50
Corg. total	10	0,5 - 3	260 - 1.560
NO_x	200	100 - 140	52.000 - 72.800
Hg	0,03	0,001	0,52

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Fig. 10: Emissions of Continuously Monitored Emissions from the Biebesheim Incinerators

(please note: in German a decimal point is a comma)

Parameter	Permit Limit (17. BImSchV) mg/Nm³	Measured Average mg/Nm³	Annual Emission kg/y
Cd	Total:	0,0001 - 0,0005	0,005 - 0,25
Tl	0,05	< 0,0005	< 0,25
Hg	0,05	< 0,002	< 1
Sb	Total:	0,001 - 0,03	0,5 - 15
As	0,5	< 0,002	< 1
Pb		0,002 - 0,1	1 - 52
Cr		< 0,0003	< 0,16
Co		< 0,001	< 0,5
Cu		0,001 - 0,03	0,5 - 15
Mn		0,0001 - 0,0003	0,05 - 0,15
Ni		0,0005 - 0,003	0,25 - 15
V		< 0,001	< 0,5
Sn		0,0004 - 0,03	0,2 - 15
Dioxins TE	0,1 ng/Nm³	0,0005 - 0,002 ng/Nm³	0,26 - 1 (mg)

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CENTRAL POLLUTION CONTROL BOARD

(MINISTRY OF ENVIRONMENT & FORESTS, GOVT. OF INDIA)

BY REGISTERED POST

F.No. B-29016(SC)/1/08/HWMD/ May 02, 2008

To

Madhya Pradesh Waste Management Project

Division of Ramky Enviro Engineers Ltd.,

Plot No. 104, Sector-II, Industrial Area, Pithampur,

Dhar District, Madhya Pradesh

DIRECTION UNDER SECTION 5 OF

THE ENVIRONMENT (PROTECTION) ACT, 1986 (Notice thereof)

WHEREAS, the Central Government has notified the Hazardous Waste (Management & Handling) Rules, 1989, and amendments, thereof, (herein referred to as HWM Rules) under the Environment (Protection) Act, 1986, for collection, reception, treatment, transport, storage and disposal; and

WHEREAS, as per Rule 4(1) of the HWM Rules, the operator of a facility shall be responsible for proper collection, reception, treatment, storage and disposal of hazardous wastes; and

WHEREAS, as per Rule 4(3) of the HWM Rules, the operator of a facility shall be responsible to take all steps to ensure that the hazardous wastes are properly handled, and disposed of without any adverse effects to the environment; and

33

WHEREAS, as per Rule 5 of the HWM Rules, the operator of a facility shall be required to obtain authorization for collection, reception, treatment, transport, storage & disposal of hazardous wastes; and

WHEREAS, as per rule 8 A (1) of the HWM Rules, the operator of a facility shall design and set up disposal facility as per the guidelines issued by the Central Government or the State Government; and

WHEREAS, as per Rule 8 A (2) of the HWM Rules, the operator of a facility shall before setting up a disposal facility get the design and the layout of the facility approved by the State Pollution Control Board;

WHEREAS, Madhya Pradesh Waste Management Project, Division of Ramky Enviro Engineers Ltd., Plot No. 104, Sector –II, Industrial Area, Pithampur, Dhar District, Madhya Pradesh (the Unit) was inspected on 24.01.2008, by the Zonal Office (CPCB), Bhopal team and it was found that:

i) Location of TSDF is not meeting the criteria as suggested under the guidelines issued by CPCB (Criteria for Hazardous Waste Landfills);

ii) The TSDF Operator have not obtained the approval from MP State Pollution Control Board with regard the designs of the secured landfill facility (SLF) and the TSDF neither designed nor constructed as per guidelines of CPCB;

iii) TSDF is in operation without having valid Consents under the Water and Air Acts as these have expired in October 2007

iv) No proper bunds around the cell as well as the leachate solar evaporation ponds have been provided so as to prevent rainwater entry into the cell and to prevent flow of materials;

v) No treatment has been proposed for wastewater or leachate generated from TSDF as the leachate is being stored temporarily in solar evaporation ponds;

vi) Reasons for higher concentrations for all the parameters analyzed from the sample; collected from the observation well near solar evaporation pond, B-6 is not determinable;

vii) Reasons for higher concentration of Zinc, Nickel, Chromium, Lead in the ranges of 73-94 mg/kg, 54-86 mg/kg; 66-69 mg/kg and 75-159 mg/kg respectively from the soil samples collected from opposite sides of the SLF, is not determinable;

viii) The technical details of the incinerator presently under installation were not made available to the team during the visit;

ix) There is no concrete wall and drainage system at the boundary of SLF as well as the TSDF so as to prevent any spillages/seepages during rainy season;

x) Even though incinerator is yet to be commissioned, the TSDF operator have already collected and stored incinerable wastes in two separate sheds and spillages were also seen within these sheds;

xi) Waste stabilization shed was open from three sides and there is possibility of rainwater entry into the shed during rains and no drainage system has been provided around the stabilization shed so as to collect the spillages etc.;

xii) No adequate free Board has been provided to the solar evaporation ponds, which may cause flooding during the rainy season.

xiii) No display board was provided as required at the entrance of the main gate of TSDF as well as at the incinerable waste storage area; and

WHEREAS the Central Government vide Notifications No. S.O. 157 (E) of February 27, 1996 and S.O. 730 (E) dated July 10, 2002, has delegated the powers under Section 5 of the Environment (Protection) Act 1986 to the Chairman, Central Pollution Control Board (herein after referred to as CPCB), to issue direction to any industry or any local or any other authority for the violation of the standards and rules, notified under the Environmental (Protection) Act, 1986 and amendments thereof.

Now, therefore, in exercise of the above mentioned powers vested under Section 5 of the Environment (Protection) Act 1986, and in view of the above serious violations, you are hereby given as opportunity to show-cause why action shall not be taken to:

i) Close the Unit for collection, reception, treatment, transport, storage and disposal of hazardous wastes with immediate effect; and

ii) To direct the concerned authorities to disconnect the supply of electricity and water to your Facility.

In case no reply is received within fifteen days from the date of receipt of this notice, action will be initiated against the Unit under Environment (Protection) Act, 1986, as amended from time to time.

(J.M. Mauskar)

Chairman

Copy to information to:

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1. Dr. Saroj, Director, HSM Division, Ministry of Environment & Forests, Paryavarn Bhawan, CGO Complex, Lodi Road, New Delhi – 110 003
2. Member Secretary, M.P. Pollution Control Board, Paryavaran Parisar, E-5, Arera Colony, BHOPAL – 462016, MADHYA PRADESH
3. The Zonal Officer, Central Pollution Control Board, 3rd Floor, Sahkar Bhawan, North TT Nagar, BHOPAL – 462 003, MADHYA PRADESH
4. MS, CPCB, Delhia

STATUS REPORT ON CONSTRUCTION & INSTALLATION OF COMMON HAZARDS WASTE INCINERATOR AT TSDF, PITHAMPUR, MADHYA PRADESH

A team comprising of the following officials from CPCB inspected the common hazardous waste Treatment, Storage & Disposal Facility (TSDF) located at Pithampur, Dhar District, Madhya Pradesh on 04.02.2009 to record the status on establishment and commissioning of common hazardous incinerator:

a) Shri A. Sudhakar, Incharge, CPCB Zonal office, Bhopal

b) Shri H.V. Gurudutt, EE, CPCB Zonal Office, Bhopal

c) Shri Anoop Chaturvedi, JSA, CPCB Zonal Office, Bhopal

The facility is being operated by M/s Madhya Pradesh Waste Management Project, a division of Ramky Enviro Engineers Ltd., Hyderabad since September 2005. Shri I.M. Sarashetti, Project Head and Dr. P. Shukla, Laboratory Manager have coordinated the visit.

01. M/S Allied Furnaces Pvt. Ltd., Mumbai was awarded the turn-key project of installation and commissioning of the common hazardous waste incinerator 1.5 MT/hr capacity of at Pithampur. The firm has executed similar project at Mumbai Waste Management Ltd., Taloja, Mumbai.

02. As per Shri Sarashetti, most of the mechanical, electrical and instrumentation parts were received on site. The works are being carried out in two shifts and efforts are being made to complete the works at the earliest.

03. The following works were seen in progress during the inspection:

I. Brick lining of secondary chamber and spray dryer.

II. Platform and staircase works at rotary furnace, secondary chamber, spray dryer.

III. Alignment of rotary furnace with secondary chamber.

IV. Disc atomizer shell wielding.

V. Piping and ducting of various parts.

VI. Cabling works at PLC and PCC rooms.

VII. Instrumentation in secondary chamber

VIII. Alignment and fixing of burners.

04. The following works are reported to be taken up in the coming days:

I. Brick lining of rotary skin.

II. Reagent injection system (yet to receive)

III. Online stack monitoring system

IV. Spiral ladder for the stack.

V. Air compressor & dryer (yet to receive)

VI. Ramp feeder, cart dumber and allied works

05. The following works and issues are not yet initiated/ decided till the date of inspection:

I. Provision of Multiple Effect Evaporator (MEE) for leachate treatment before spray dryer.

II. Provision of DG set (proposed 125 & 750 KVA capacities)

III. Storage shed for waste at the plant

IV. Additional water tank to meet the atomizer requirement

V. Development of a buffer zone

VI. Revised on-Site Emergency Plan in view of Incinerator installation

VII. Land use conversion from agriculture land to industrial category

06. At the time of inspection the Facility was being operated without valid consents and authorization. The status of consents and the authorization is given below:

S.No.	Consent/ Authorization	Valid upto	Applied on
01	Water Consent	31.10.2008	30.04.2008
02	Air Consent	----	15.02.2008
03	Authorization	03.10.2008	06.06.2008

07. At the time of inspection, the Facility has stored 1,136.32 MT of incinerable waste in two sheds – intractable shed (657.968 MT) and temporary shed (478.352 MT). About 22,142.876 MT was sent directly to the landfill and another 9,946.124 MT of waste was treated/ stabilized and disposed in the landfill.

08. An unknown quantity of waste in puff form having very low density was stored in the premises by securing it between HDPE liners. The new incinerable waste was received at the site about 20 days back. About 55.125 MT of waste received during April 2008 to January 2009 for land filling was diverted for incineration purpose after Finger Print Analysis of the samples.

09. The Facility was issued directions by CPCB on July 16, 2008 after hearing the views of the Operator on 09.07.2008. It was observed that the Operator has violated two major directions – installation of Multi effect Evaporator followed by Spray Dryer for treatment of leachate by 31.12.2008 and not to procure incinerable hazardous waste till the incinerator is commissioned.

10. In a reply to the CPCB directions, the Operator requested CPCB on 10.10.08 to approve VOC stripper in place of Multiple Effect Evaporator (MEE), without providing any technical details. At the time of inspection, no technical details

were made available for the team either on VOC stripper or on MEE. The Operator has not submitted any proposal for CPCB approval in this regard.

11. With reference to the Directions given by CPCB, MPPCB directed the TSDF to follow the CPCB Storage guidelines. Most of the storage guidelines were yet to e followed by the Facility. Emergency door were provided in the sheds and two smoke detectors were installed in the intractable shed. However, it was observed that both the detectors were not working, when tested by the team.

12. The TSDF has not yet replied to the queries raised by the technical committee during the presentation made at MPPCB on 11.12.08. The issues were communicated to the TSDF for replying within 15 days vide the SPCB's letter dated 23.01.09. The issues include design details and operation parameters of incinerator.

CONCLUSION: The Operator of TSDF had proposed to install the incinerator by December 2006 at the time of commissioning the landfill capacity. Inspite of spiral letters and assurances, the installation of incinerator has been delayed by months and years and is still nowhere near completion. In the opinion of the inspecting team, the following works are still remaining and may require adequate team for completion and commissioning the Incinerator after February 05, 2009:

S.No.	Description of Works	Time Schedule for completion
01	The construction works and installation of equipments & machinery of plant	At least 3 months
02	HT Power Connection	At least 3 months
03	Provision of standby power (DG set)	3 Months
04	Development of Buffer zone	

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05	Provision of fire-fighting arrangements	
06	Consents to operate and authorization	
07	Trials & stabilization of plant	2 months
08	Waste evacuation from the Intractable shed to store the waste from UCIL	1 month

The above schedule is based on the capabilities of the operator to adhere to the time schedule as envisaged during the last year while establishing 9th January, above cited reasons, the limited technical manpower available with the Operator. In addition to above, there is a need for a considerable time for trial run and stabilization of operation of incinerator before it can be put into continuous operation.

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Status of Implementation of the recommendations made in the previous visit

Sl.no	Recommendations	Industry reply	Status as on 24.01.2008
1	The distance criteria of landfill site is not as per the CPCB guidelines. The village Tarapur is located within one kilometer distance.	Village Tarapur is located at one KM distance away from Secured landfill facility. We are compliant with the guidelines laid down by CPCB. We are also enclosing herewith the approval copy of MPPCB.	It appears the village is located within 500m from the plant boundary. Exact distance May be measured for verifying the compliance status.
2.	Wastes were not stored properly. The wastes of different categories were mixed up and spillages were seen in the storage sheds.	We have stored the landfill wastes after doing compatibility study. Incompatible wastes are not kept together. Regarding spillages, we have stored the wastes in a shed having concrete flooring with lining and each store is provided with a leachate storage sump. The leachate generated is	No progress was made

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		collected and disposed.	
3	The spillages from the movement of wastes were seen at storage, treatment and landfill areas and provisions made for collection of spillages is not adequate.	We collect wastes that might spill, with a brush and scooper and dispose it suitable. We have noted your observation and shall ensure that it is acted upon.	Spillages were seen inside the incinerable waste storage sheds
4.	No treatment facilities provided for incinerable wastes and the waste water generated in the treatment at TSDF.	Incinerator facility shall be operational by March 2008 and the wastewater will be used for quenching the hot gases, in the spray drier. In the meantime, we are using the solar evaporation pond.	1.5 T capacity rotary kiln incinerator was being installed at the time of visit.
5.	The liners provided do not match with the specifications given in the guidelines of CPCB. The design of cell or landfill not approved by MPPCB.	The liners provided at the landfill are as per guidelines only and design of landfill cell is approved by MPPCB. Observations of MPPCB and relevant certifications issued by third party inspection agencies are enclosed.	No progress was made
6.	Display board regarding hazardous wastes being handled by the facility is	We have now displayed records of hazardous waste handling at a facility's	Provided, but not displayed as per the

	not placed at the CTSDF main gate.	main gate as per guideline	guidelines.
7.	The location of solar evaporation pond (SEP) on the edge of the site may pose threat in case of any flooding of the site. The ground was sloping down towards the SEP and there was no space available to contain the effluent in case of overflow.	The location of Solar Evaporation Pond (SEP) has been strategically planned while designing layout of the facility. There is a channel between the landfill and SEP, allowing flow of rainwater. There is no probability of site getting flooded, since it is located at a hillock. The SEP has enough capacity to hold precipitation. During rains, it is under a close watch. In case any overflow is foreseen, we will store water in separate tanks.	No proper precautionary measures were taken
8	No visible signs of warning for public are displayed on the power fence covering the entire CTSDF.	We have now put danger boards at appropriate locations along the fencing.	Complied.
9.	The bunds of operational cell (cell-B) are not properly laid to prevent rain water entry	The landfill bunds have enough outward slopes to ward off rainwater entering from the landfill.	No progress was made

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	in the cell. The height of bunds required to be raised above the ground level to prevent flow of material from other side.	**These bunds are of adequate height above ground level.**	
10.	Facility have collected incinerable waste without having permission from the M.P. Pollution Control Board, Bhopal.	**We have noted the observation. We are trying** our best to put the incinerator of 1.5 MTPH (5.75 MKCal/Hr.) by **March 2008 Civil works for the plant are almost over** and all the equipments and components have been ordered and are under procurement and **fabrication in Maharashtra and Gujarat. We assure** you however that we shall make all efforts to put up the incinerator at the **earliest.**	Permission not yet obtained
11.	The floor and side walls of waste storage shed and the stabilization shed have been found damaged to due to movement of vehicles.	**The floor of stabilization shed had a ditch due to soil settlement, which has been repaired.**	Complied.

12.	The operator should prepare a monitoring schedule and monitor the surface and ground water, soil and ambient air quality at the locations, duly approved by the MPPCB. Laboratory should complete the development of all the required facilities.	**We have a soil, surface & ground water monitoring plan in place, which we are adhering to. Ambient air monitoring is regularly carried out by MPPCB laboratory. Records are available at the facility. However, we have planned to carry out air monitoring by a competent testing facility. Some of the reports are enclosed for your ready reference.**	Except AAQ, all other monitoring done in consultation with MPPCB.
13.	The internal roads are not pucca and plantation was also not done in the facility.	**Internal roads will be made pucca after the monsoon this year. This season will ensure consolidation/compaction. We have carried out plantation of approx 4000 nos. saplings from April '07 till date. More plants are being sown this monsoon. We assure you that our site will become a green area within 1-2 years.**	No progress was made