

# CHOKING IN GARBAGE – II

**Analysis of Ambient Air quality inside the Open Municipal Waste Burning Site at Kodungaiyur, Chennai**



**Community Environmental Monitoring**

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**Acknowledgements:**

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Cover photo from Ambattur Municipal garbage dumping ground.

## Executive Summary

The city of Chennai generates 3200 tonnes<sup>1</sup> of garbage everyday. Kodungaiyur is one of two official dumping grounds operated by the Corporation of Chennai. Kodungaiyur is located near a residential area with a population of more than 100,000 people. Since its inception in 1989 the Kodungaiyur dumping ground has been the solitary source of woes for the residents of the area.

The groundwater and air in the areas surrounding the yard are heavily polluted due to the illegal dumping. Unsanitary conditions at the dumpyard have made it an ideal breeding ground for flies and pests. Illegal bio-medical waste dumping has created a haven for stray dogs that feed on the human remains discarded by city hospitals. Residents cite numerous instances when dogs have dragged human parts on the main road and serious fights have broken among packs of dogs over human body parts.

The Tamil Nadu Pollution Control Board has issued numerous show-cause notices to the Corporation for indiscriminate burning of garbage based on community complaints. Unfortunately this has failed to earn a response from the Corporation of Chennai.

Community health in the hinterlands has suffered a serious blow due to the constant assault from the cocktail of chemicals from the dumping ground. Respiratory tract disorders are abnormally high especially amongst children. Residents also feel that the instances of cancer are on the rise but due to the absence of any regular health monitoring substantiating figures is difficult.

Dissatisfied with the response of the authorities, local resident welfare groups approached Community Environmental Monitoring (CEM) for an analysis of the ambient air quality in the area. CEM had done a similar air analysis at an open garbage-dumping site at Perungudi, Pallikaranai. On the 23<sup>rd</sup> of August 2006 an air sample was taken inside the Kodugaiyur

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<sup>1</sup> Corporation of Chennai, Solid Waste Management Department - <http://www.chennaicorporation.com/swm/swm.htm>

dumpyard at 2:30pm in the presence of members of local Resident Welfare Associations. The sample was taken in a special Tedlar bag using a bucket as a container to house the bag. The sample was sent to Columbia Analytical Services in Simi Valley, California, for analyses of 69 volatile organic compounds and 20 sulphur gases as per established procedures of the US Environmental Protection Agency (USEPA).

A total of 9 chemicals were detected in the ambient air and 5 of them were above the USEPA Region 6 levels<sup>2</sup>. Of the 5 chemicals that exceeded the permissible limits, 3 are known to cause cancer in humans and animals. The findings are only a conservative estimate of the quality and quantity of chemicals present in the air. Many factors like the wind direction, climate and transit delay impact the concentration of the chemicals in the sample.

Upon comparison with an earlier sample taken at the Perungudi dumping ground, it was found that 8 out of the 9 chemicals found at Kodungaiyur were also found in the air sample from Perungudi. The only factor that could influence the pollutants in the air would be the composition of garbage that is burnt. Toxic material such as Poly Vinyl Chloride (PVC) and other plastics, solvents and metals contribute to the toxicity of the air. However, these chemicals are impossible to destroy completely and can damage the environment and human health at levels as low as a few parts per billion cubic meters of air. Burning of any kind, crudely in the open or scientifically inside an incinerator is one sure way of releasing these chemicals into the environment.

The issue at hand needs immediate attention and a durable solution. Most of these chemicals like Carbon Disulphide, Acetone, 2-Butanone, Toluene etc, found in the air analysis, either target the central nervous system, the respiratory system, the cardio vascular system, the reproductive system or major organs of the body like the liver and kidneys. Chemicals like Chloromethane, Benzene, 1,4-Dichlorobenzene are even known to cause cancer in humans and animals. This is important given the dense residential population in the area (more than 100,000).

Given the prevalence of street-side open garbage dumping and burning in India, the findings should be alarming both for the common citizen and the policy makers. This problem threatens to worsen unless there is a decrease in our daily dependence on poisonous substances. Banning incineration or open burning will not solve the problem unless restrictions are imposed at the policy level to regulate certain materials.

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<sup>2</sup> USEPA region 6 Screening Level is calculated for residential exposure. The levels are based on a 1 in a million cancer risk or a 'hazard quotient' of 1 for non-cancer effects - [http://www.epa.gov/earth1r6/6pd/rcra\\_c/pd-n/screen.htm](http://www.epa.gov/earth1r6/6pd/rcra_c/pd-n/screen.htm)

## Garbage in Chennai

Chennai generates more than 3200 metric tonnes of garbage every day. This garbage consists primarily of organic waste, different kinds of plastics, packaging waste, paper, metal, glass, construction debris, bio-medical waste and slaughterhouse waste. According to the Central Pollution Control Board estimates, an average person in a Class I city (urban areas of population of 100,000 and above), produces about 0.4kgs of garbage a day. Per capita waste generation in lower income and higher income groups is 180 gms and 800gms respectively.

Urban local bodies spend about Rs. 500 to Rs. 1500 per tonne of waste collected, transported and disposed. From the waste collected 95% is dumped on land and only 5% is composted.<sup>3</sup>

In Chennai, the Municipal Corporation of Chennai is responsible for garbage collection and disposal on a daily basis. The city of Chennai and its 3,200 tonnes of garbage find its way to one of two major dumping grounds Kodungaiyur and Perungudi, both on the fringes of the main city.

## Kodungaiyur

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<sup>3</sup> ENVIS Newsletter on Solid Waste Management, Oct-Nov 2005 (Vol. 1), A project of the MoEf,

The Kodungaiyur dumping ground is part of a 400 acre marshland adjacent to the Kodungaiyur sewage treatment plant on the southern margins of flood prone alluvial lowlands of Korattalayar River. The area is primarily residential with the Manali Petrochemical Park to the north of the dumping ground.

The Kodungaiyur dump officially receives garbage from 5 of 10 Corporation zones including Tondiarpet, Basin Bridge, Pulianthope, Ayanavaram and Kilpauk<sup>4</sup> making it the largest dumping site in the city. The Corporation is officially allotted 65 acres but the residents claim that 350 of the 400 acre site are illegally used for dumping. Metro Water and Corporation of Chennai jointly own the land. The municipal waste dumping in Kodungaiyur began in 1989. Prior to this, the land was used to grow cattle fodder.

The dump is not a sanitary landfill. The garbage is dumped on unlined ground, and the dumpsite has been chosen without any regard to critical criteria such as proximity to residential areas and impacts on groundwater and people's health.

Kodungaiyur is an ecologically sensitive area. It is one of the few remaining natural marshlands in Chennai. The Corporation of Chennai recognizes Kodungaiyur and Pallikaranai as marshlands but still continues the dumping<sup>5</sup>.

It is an inappropriate location also because of the proximity to human settlements. More than 100,000 people reside in the surrounding areas including in Raja Ratinam Nagar, Krishnamurthy Nagar, Kaviarasu Kannadasan Nagar, Muth-thamizh Nagar, Ezhil Nagar, Netaji Nagar, Thiruvalluvar Nagar and MKB Nagar.

The Tamil Nadu Pollution Control Board (TNPCB) and local groups have warned the Corporation numerous times against the open burning and dumping of unsegregated garbage. "The Corporation blamed the rag pickers for the menace, following which a wall was constructed to restrict the entry of unauthorized people into the ground, but the burning still continues and is probably worse than before," says A. Pandurangan of Kaviarasu Kannadasan Nagar Citizens Welfare Association (KKNCWA).

The TNPCB since 2002 has issued numerous show cause notices to the Corporation for indiscriminate garbage burning. The main targets of the pollution are the residents, especially children, in the immediate vicinity. "Upper respiratory tract diseases are the most prevalent among residents and the incidences of cancer are also on the rise," says P. Ganesan of the KKNCWA.

Even bio-medical waste from the Government Hospital, Kilpauk Medical College Hospital and Stanley Hospital is regularly dumped in Kodungaiyur. Ramachandaran Rao of the Ever Vigilant Citizens Welfare Association says "It's a horrible sight;

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<sup>4</sup> Source: Corporation of Chennai

<sup>5</sup> Corporation of Chennai, Solid Waste Management - <http://www.chennaicorporation.com/swm/swm2.htm>

dogs in the dump go mad every time a medical waste truck drives in. One can see them tearing apart parts of human remains, sometimes they drag them from the yard onto the main road.”<sup>6</sup>

Local resident welfare groups like the Ever Vigilant Resident Welfare Association began the struggle against garbage dumping 8 years ago. Recently many affected residents formed similar associations to challenge the issue and in February 2006, 32 local groups formed the Federation of North Chennai Residents Welfare Association in an attempt to amplify their protests. The Corporation and the TNPCB have ignored the appeals and protests of the residents, and have failed to take any action.

In 2000, the Municipal Solid Waste Handling Rules came into existence, which gave local bodies like the Municipal Corporation of Chennai a 2001 deadline to improve existing landfills and a December 2002 deadline to identify and make operational new landfills. The Rules also required the local civic bodies not to collect unsegregated garbage and prohibited burning of any kind of garbage. The Corporation of Chennai has failed to fulfill these requirements till date.

## Air Sample

On the 23<sup>rd</sup> August 2006, an air sample was taken inside the Kodugaiyur dumpyard at 2:30pm in the presence of members of local Resident Welfare Associations. The sample was taken in a special Tedlar bag using a bucket as a container to house the bag. The sample was sent to Columbia Analytical Services in Simi Valley, California, for analyses of 69 volatile organic compounds and 20 sulphur gases as per established procedures of the US Environmental Protection Agency.

### **Conditions during sampling:**

The wind direction at the time of sampling was from South East to North West. There was a very pungent odour of burning garbage. The sampling team also reported symptoms such as headache, throat irritation and difficulty in breathing as a result of the exposure to the smoke in the area. The air was dense with smell of partially burnt materials but there was no appreciable smoke except from small mounds of smoldering garbage heaps.

### **Findings:**

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<sup>6</sup> Where stray dogs devour Human flesh – by Karthik Subramanian, The Hindu, June 11 2004

1. A total of 9 chemicals were detected – Carbon Disulphide, Chloromethane, Acrolein, Acetone, Methyl Ethyl Ketone, Benzene, Toluene, 1,2-Dichlorobenzene and d-Limonene.
2. 5 chemicals – Carbon Disulphide, Chloromethane, Acrolein, Benzene and 1,2-Dichlorobenzene exceeded the USEPA Region 6 Screening levels or any other levels.
3. 3 out of 9 chemicals are known to cause cancer in humans or animals; all the cancer causing chemicals are above screening levels
  - 1,2-Dichlorobenzene is 210 times above the USEPA Region 6 Screening Level.
  - Benzene is 68 times above the USEPA Region 6 Screening Level.
  - Chloromethane is 9.09 times above the USEPA Region 6 Screening Level
4. Of the 9 chemicals found, 8 chemicals target the eyes and the skin, 7 target respiratory and central nervous system, 5 target the kidneys, 4 target the liver, 2 target the reproductive system and the Cardio Vascular System, 1 targets the bone marrow and Peripheral Nervous System.

S No	Chemical found	Levels detected (ug/m3)	Health based Screening levels (ug/m3)	Number of times exceed the screening levels (approx)	Odour	Health Effects	Target Organs	Carcinogen
1.	Carbon Disulphide	16.0	3 (Texas Long-Term Screening Levels)	5.33	A sweet ether-like odour	Dizziness, headache, poor sleep, weakness, exhaustion, anxiety, weight loss; gastritis; kidney, liver injury; eye, skin burns; dermatitis; reproductive effects	central nervous system, peripheral nervous system, cardiovascular system, eyes, kidneys, liver, skin, reproductive system	No
2.	Chloromethane	10	1.1 (USEPA Region 6 health based screening levels)	9.09	A faint, sweet odour which is not noticeable at dangerous levels	Dizziness, nausea, vomiting; visual disturbance, stagger, slurred speech, convulsions, coma; liver, kidney damage; reproductive damage; [potential occupational	Central nervous system, liver, kidneys, reproductive system, Cancer Site [in animals: lung, kidney & forestomach tumors]	Yes



						carcinogen]		
3.	Acrolein	7.50	0.021 (USEPA Region 6 health based screening levels)	357.14	A piercing, disagreeable odour	Irritation eyes, skin, mucous membrane; chronic respiratory disease	Eyes, skin, respiratory system, heart	No
4.	Acetone	29	370 (EPA Region 6 Screening Level)	--	A fragrant, mint-like odour	Irritation eyes, nose, throat; headache, dizziness, central nervous system depression; dermatitis	Eyes, skin, respiratory system, central nervous system	No
5.	2-Butanone (Methyl Ethyl Ketone)	6.9	1000 (EPA Region 6 Screening Level)	--	A moderately sharp, fragrant, mint or acetone-like odour	Irritation eyes, skin, nose; headache; dizziness; vomiting; dermatitis	Eyes, skin, respiratory system, central nervous system	No
6.	Benzene	17	0.250 (EPA Region 6 Screening Level)	68	An aromatic odour	Irritation eyes, skin, nose, dizziness; headache, nausea, exhaustion; bone marrow depression; [potential occupational carcinogen]	Eyes, skin, respiratory system, blood, central nervous system, bone marrow Cancer Site [leukaemia]	Yes
7.	Toluene	9.8	400 (EPA Region 6 Screening Level)	--	A sweet, pungent, benzene-like odour	Irritation eyes, nose; weakness, exhaustion, confusion, euphoria, dizziness, headache; discharge of tears; anxiety, muscle fatigue, insomnia; liver, kidney damage	Eyes, skin, respiratory system, central nervous system, liver, kidneys	No
8.	1,4-Dichlorobenzene	5.9	0.0280 (EPA Region 6 Screening Level)	210.7	A mothball-like odour	Eye irritation, swelling periorbital (situated around the eye); profuse rhinitis; headache, anorexia, nausea, vomiting; weight loss, jaundice, cirrhosis; in animals: liver, kidney injury; [potential occupational carcinogen]	Liver, respiratory system, eyes, kidneys, skin  Cancer Site [in animals: liver & kidney cancer]	Yes
9.	D-Limonene	21	--	--	--	Irritation eyes, skin, nose, throat; headache, dizziness, convulsions; blood in the urine, kidney damage; abdominal pain, nausea,	Eyes, skin, respiratory system, central nervous system, kidneys	No

					vomiting, diarrhoea; chemical pneumonitis		
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## Violations

The residents of Kodungaiyur have been reeling under unprecedented levels of pollution for the past 20 years. The Municipal Solid Waste Handling Rules, 2000 have been blatantly violated by the Corporation of Chennai in many ways. The following conditions,<sup>7</sup> for instance, have all been violated at the Kodungaiyur dumpsite.

Rule 8 of site selection criteria under Schedule III of Municipal Solid Waste Handling Rules, 2000 states, *“The landfill site shall be away from habitation clusters, forest areas, water bodies, monuments, National Parks, Wetlands and places of important cultural, historical or religious interest”* – **Kodungaiyur is a wetland and is in close proximity to human habitation. An estimated 100,000 people reside in Kodungaiyur.**

Rule 9 of site selection criteria under Schedule III of Municipal Solid Waste Handling Rules, 2000 states, *“A buffer zone of no-development shall be maintained around landfill site and shall be incorporated in the Town Planning Department's land use plans”*– **Many residential colonies like Mahalakshmi Nagar, Thendral Nagar and Aishwarya Nagar have been set up within ½ kms of the dump yard after 2000. Many residential settlements have pre-dated the dumping ground, which was set up in spite of the fact that there were human settlements in the vicinity.**

Rule 1.4 of collection of municipal solid waste under Schedule II of Municipal Solid Waste Handling Rules, 2000 states, *“Bio-medical wastes and industrial wastes shall not be mixed with municipal solid wastes and such wastes shall follow the rules separately specified for the purpose”* – **Bio-medical waste is regularly dumped into the dumping yard by the city hospitals. Residents have complained about this numerous times to the authorities but have failed to evoke any action.**

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Schedule II and III of Municipal Solid Waste Handling Rules 2000, Govt. of India

Rule 1.8 of collection of municipal solid waste under Schedule II of Municipal Solid Waste Handling Rules, 2000 states, “*Stray animals shall not be allowed to move around waste storage facilities or at any other place in the city or town and shall be managed in accordance with the State laws*” – **Stray cows, pigs and dogs are a common sight at Kodungaiyur.**

Rule 1.7 of collection of municipal solid waste under Schedule II of Municipal Solid Waste Handling Rules, 2000 states, “*Waste (garbage, dry leaves) shall not be burnt*” – **Garbage burning is a regular practice at all dumping grounds in India and Kodungaiyur is no exception. The air sample reflects the chemicals emitted due to burnt garbage. A wall was built around the dump yard to prevent unauthorized people, especially rag pickers (who the Corporation blamed for setting garbage on fire), from entering. The garbage burning still continues as before.**

## **Demands**

**Stop burning and dumping immediately** – Based on the testimonies of the residents and the history of the Kodungaiyur dumping yard all dumping has to be ceased immediately. The health and environment in the area has suffered a serious set back. The government even now fails to realize that the only solution to the problem is the restrictions on material usage and disposal. Policy level interventions should be imposed on materials like plastics, which have to be phased out, and replaced with eco friendly products. Hazardous products (like batteries, PVC, pesticide and chemical containers) using toxic substances should be returned to the producer.

**Medical rehabilitation** – The health of Kodungaiyur residents, particularly the children, is seriously compromised. The Corporation must pay for a comprehensive health study and medical treatment and rehabilitation for affected persons based on the study.

**Implement Municipal Solid Waste Rules, 2000** - The Corporation of Chennai has exceeded the 2001 deadline laid by the Central Govt. for safe handling and disposal of municipal solid waste by 5 years. The Act clearly mandates segregation of garbage at source ie; at the household level also requires the local bodies to educate citizens on waste segregation. The Corporation had initiated citizen awareness programs on waste segregation but most of them fell flat due to lack of initiative and follow up. These programs need to be revived.

**Segregation at Source** – Waste segregation at source solves a major part of the waste management challenge. Non-biodegradable substances should be separated from kitchen and garden waste at home. Collection, treatment and disposal of Biodegradable and Non-biodegradable garbage should be done separately. Organic wastes should be composted at household level and also at centralized facilities.

**Sustainable Solution** – The problem of the residents of Kodungaiyur should not be looked at in isolation; all our cities are facing similar problems. Recommending shifting of the disposal site will not mean an end to the problem. Landfilling or

incinerating any kind of waste especially municipal waste creates new problems rather than solve problems. Incineration generates highly toxic chemicals like dioxins and furans. Landfilling leads to groundwater contamination and a host of air, odour and pest problems. Source-side solutions should be implemented for example producers of unsustainable products like plastic packaging, toxic batteries, tubelights should be held responsible for collection and disposal of end-of-life products. Raw material and products that are environmentally friendly should be promoted to reduce waste and change the nature of waste generated.

## Perungudi

In early December 2005 after the release of the report on the national ambient air quality 'Smoke Screen'<sup>8</sup> which included the findings of the air sample taken at Perungudi, members of the resident welfare associations requested Community Environmental Monitoring (CEM) for a similar air analysis at Kodungaiyur.

The Perungudi sample was one of the three most toxic samples across the country, but unlike Perungudi, the Kodungaiyur dumping ground is located in a thickly populated locality, which makes it a matter of more concern.

The Perungudi dumping ground is totally spread over 618 acres on the Pallikaranai Marshlands in which about 55 acres is officially allotted for garbage and sewage disposal to the Municipal Corporation of Chennai but unofficially about 250 acres are used. The Pallikaranai Marshlands that holds the Perungudi dumping ground is of unique ecological and economic importance. Pallikaranai is the largest natural rainwater harvesting system in the region, which is linked to the Bay of Bengal through a network of channels. It has been a source of drinking water to people in the immediate neighbourhood (south Chennai), and has sustained agriculture for many centuries.

Pallikaranai, in its original state, used to store large quantities of storm water, even while allowing excesses to flow into the sea. This served two important functions – flood control in the surrounding areas, and groundwater recharge. The city of Chennai learnt its lesson the hard way last year during the monsoons when areas like Madipakkam, Velachery, Taramani, Sholingalur and the neighbouring suburbs were inundated with flood waters for weeks as a result of indiscriminate encroachments on the marshlands like the Perungudi dumping ground and the IT Corridor with its software parks, which has blocked all the natural waterways and storm water channels in the area.

In September 2005, CEM analyzed the ambient air at the Perungudi Dumping Grounds and found 27 toxic chemicals including 3 carcinogens.

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<sup>8</sup> Full version of report at – [http://sipcotcuddalore.com/downloads/choking\\_in\\_garbage.pdf](http://sipcotcuddalore.com/downloads/choking_in_garbage.pdf)

Recently, bowing to community pressure and 20 year long campaign to save the marshlands, the Tamil Nadu Pollution Control Board and the Department of Environment declared the Pallikaranai Marshlands protected and banned all dumping. But the local communities have proof that the ban has remained on papers and it is business as usual for Onyx, a private garbage management company and Chennai Corporation. Surprisingly the decision to declare Pallikaranai Marshlands as protected comes at a time when the state government is trying to woo the IT MNC's that dot the new Information Technology Corridor encroaching upon the Pallikaranai Marshlands. If the dumping continues it would deface the dream corridor and discourage investments.

### **Annexure I**

Waste – Waste is any substance, which is normally considered useless or unwanted, it may be solid, liquid or gaseous form. Waste is generated through-out the life cycle of a product, right from extraction of raw materials to manufacturing and the final disposal. The material used determines the environmental impact of the product, when it ends as waste. As the world gets smaller and our cities larger, civilizations world over are experimenting with different methods to tackle this everyday poser in a sustainable manner but like our lifestyles even our disposal problems are getting complex. “Developed” and technologically advanced countries like the USA and UK are also at a loss when it comes to solving this very basic problem. Existing and vigorously promoted technologies like landfills/incinerators are all end of the pipe solutions, which pose grave environmental and human cost. Numerous studies have highlighted the impacts of landfills and incinerators on human health<sup>9</sup>.

To solve the crisis we need to introspect our lifestyles and not focus on myopic solutions. For instance manufacturers make products with shorter life spans and also use chemicals and materials that are inherently toxic in nature (PVC, Asbestos, Plastics etc.), no amount of precaution can contain the release of toxins due to disposal of such products.

### **Types of Waste**

Wastes are categorized into different types based on different criteria<sup>10</sup>:

(a) Based on the source of generation:

- Municipal waste – generated from homes, shops, commercial establishments etc.
- Industrial waste – generated from industrial units.
- Hospital or Biomedical waste – generated from hospitals and clinical laboratories etc.

(b) Based on the physical characteristics:

- Solid waste – garbage, industrial waste
- Liquid waste – sewage and industrial effluents
- Gaseous waste – automobile exhaust gases, smoke from burning fuels, industrial emissions.

(c) Based on the degradability:

- Biodegradable – Waste which can be degraded by microorganisms like bacteria, fungi. eg: Vegetable wastes, litter, plant material.

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<sup>9</sup> Global Anti-Incinerator Alliance [www.no-burn.org](http://www.no-burn.org) - Impacts of Incinerators

<sup>10</sup> ENVIS Newsletter on Solid Waste Management Oct-Dec 2005 <http://ponenvis.pon.nic.in/ENVIS/news2005.pdf>

- Non-biodegradable - Waste which cannot be degraded by microorganisms. eg: Plastics, PVC, metal scrap many synthetic materials.
- (d) Based on the hazardousness:
- Hazardous wastes – which are inflammable, corrosive or toxic or reactive. eg: wastes from electroplating etc.
  - Non-hazardous wastes – which do not cause much harm. eg: vegetable wastes.
- (e) Based on recyclability:
- Recyclable waste – Which can be put to reuse eg: Glass, metal scrap, some kinds of plastics etc.
  - Non-recyclable waste –Which cannot be put to reuse eg: Poly vinyl Chloride (PVC).