

Waste Incineration-Zero Pollution or Zero Truth?

A report on the alarmingly high levels of heavy metal contamination and other violations by the waste incinerator In Manali, Chennai



A joint fact-finding report by-

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Executive Summary:

An incinerator is basically a furnace for burning waste.¹ The “green” incinerator in Manali, Chennai installed by the Greater Chennai Corporation (GCC) claims to burn 10 tons of Municipal Solid Waste (MSW) in an “eco-friendly” way by adopting “zero waste disposal technology” causing “zero pollution”². However, the communities living in the vicinity of the plant have complained of severe pollution and health impacts since its inception in 2019. Some of the complaints raised by the communities living beside it include deposition of black soot from the incinerator on their terrace (Fig 1), contamination of surface and groundwater, breathing issues and other related health issues. *The NEWS Minute* had also done a ground story³ recently on the impacts of the pollution caused by the plant installed by the GCC.



Fig 1: Deposition of black soot from the incinerator on the walls of the residences

To assess the impacts of the incineration plant, our fact-finding team, with an expertise in environmental pollution, public health, and community engagement, visited the affected area and with great difficulty collected soil samples. The results of the soil sampling is only the tip of the iceberg and testing of the flue gas, leachate and groundwater contamination could reveal the real impact which could be several times higher. The fact-finding team gathered soil samples from the area, facing significant challenges and dangers in the process. We also interacted with the impacted community to understand the health issues faced by them.

The lab results of the samples taken near the vicinity of the plant have revealed that heavy metals such as Lead, Chromium and Cadmium are much higher than the WHO standards. Particularly, the concentration of Cadmium which is toxic to the respiratory, renal and skeletal system and a carcinogen is 24 times higher than the prescribed limits. Repeated Right To Information (RTI) applications to the GCC by our fact-finding team have failed to yield any information regarding the legal permits obtained by these facilities from various regulatory bodies.

Despite strong opposition to the plant and complaints to the concerned officials by the residents, the plant continues to operate with impunity. This report also throws light on the environmental, health, legal and financial issues of the incinerator plant in Chennai which should be a strong caution against establishing two new incinerators a.k.a “waste to energy

¹ <https://www.sciencedirect.com/topics/engineering/incinerator>

² <https://makincinerator.com/>

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<https://www.thenewsminute.com/tamil-nadu/chennai-will-soon-burn-2100-tonnes-of-garbage-everyday-how-will-this-affect-us>

(WTE)” in Chennai which will be 360 times bigger than the current incinerator and could potentially impact the health of close to 1.8 million people of Chennai⁴.

Problem Statement:

The 10 ton per day incinerator installed by the GCC is located in the **Chinna Mathur area of Manali** in North Chennai (Fig 2). It was the first incinerator in Chennai, designed to burn MSW, especially dry waste generated within the corporation limits. The GCC claimed that, “It would produce “pure carbon ash” that was not harmful to the environment and would be used to produce paver blocks, brick mixing and other construction materials. The GCC wanted to set up 30 such incinerator plants across Chennai and planned to tap the CSR funds of various companies to set up these plants”⁵. However, how these plants have devastated the surrounding areas and communities is revealed in this report.



Fig 2: Location of the Manali incinerator plant in MGR Salai, Mathur, Chennai 600051

Soil Testing Near The Incinerator

The site for collection of the soil sample (Fig 3) was selected based on the discussion with the communities and on ground investigation of the place where the incinerator ash was being dumped. Appropriate tools were used to collect the sample and the collected sample was secured in a clean *ziplock* bag to avoid contamination. Hand gloves were used to ensure that there was no contamination. The collected sample was immediately delivered

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<https://www.nytimes.com/2024/11/09/world/asia/india-air-quality-trash.html?smid=nytcore-ios-share&referrerSource=articleShare>

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<https://timesofindia.indiatimes.com/city/chennai/corps-first-waste-incinerator-to-come-up-at-manali/articleshow/70268207.cms>

to Tamil Nadu Test House which is a NABL accredited testing lab with certificate number TC-12551⁶.



Fig 3: Location where the sample was collected with coordinates- 13°10'39.2"N 80°15'13.1"E

Test Results And Interpretation

The collected sample was tested for heavy metals using **Inductively Coupled Plasma Mass Spectrometry (ICPMS) technique**, known for its high sensitivity, ability to analyze multiple elements simultaneously, and relatively low detection limits.⁷ Heavy metal contamination was tested in the collected samples because incinerators across the world have been notorious for releasing heavy metals when improperly regulated.⁸ Heavy metals are toxic with a high leaching potential into the surrounding areas including soil, water bodies, food chain and ground water. It also poses significant risks to human and animal health through direct contact, ingestion of contaminated food or water, and inhalation⁹.

Comparison of the sample results with WHO standards

S.No	Parameters	Sample results (in mg/kg)	WHO Standards (in mg/kg)	No of times above WHO limits ¹⁰
1.	Cadmium	19.22	0.8	24 X
2.	Lead	101.8	85	1.2 X
3.	Chromium	116.63	100	1.2 X

⁶ https://tamilnadutesthouse.com/wp-content/uploads/2023/12/TNTH-NABL-CERTIFICATE_2023.pdf

⁷ <https://shorturl.at/TxliX>

⁸ <https://shorturl.at/8zhvv>

⁹ <https://shorturl.at/UZyiv>

¹⁰ <https://www.ijsrp.org/research-paper-0819/ijsrp-p92125.pdf>

Health Impacts Of The Chemicals Found In The Soil

Cadmium:

In the soil sample, cadmium was found to be exceeding WHO soil standards by 16 times. Cadmium^{11&12} is a toxic transition metal found in the environment as a pollutant introduced by various activities including incineration of municipal waste (especially cadmium-containing batteries and plastics). Cadmium is water-insoluble and inflammable when burned in air, it results in Cadmium oxide. Major routes of exposure to humans are ingestion and inhalation.

Cadmium is known to be toxic to kidneys, skeletal system, respiratory system and is also identified as a human carcinogen¹³. Long-term exposure to cadmium can lead to renal tubular dysfunction, which results in increased excretion of low-molecular-weight proteins in the urine. If left untreated, it could progress into irreversible tubular dysfunction and then lead to nephropathy. High intake of cadmium through contaminated food results in calcium metabolism disruption, formation of renal stones and effects on bones. Osteoporosis and osteomalacia have been found to occur in those who live or work near the cadmium-contaminated areas. High exposure to Cadmium oxide fumes acute pneumonitis with pulmonary oedema, which may be lethal. Long-term, high-level occupational exposure is associated with lung changes, primarily characterized by chronic obstructive pulmonary disease. There is sufficient evidence for a link between Cadmium exposure and lung cancer.

Lead:

Lead was found to be 1.2 times higher than that of WHO soil standards. Lead is a naturally occurring toxic metal and its widespread use has resulted in environmental contamination, human exposure and public health problems across the globe¹⁴. While there are multiple sources for Lead, here are some of the important sources of Lead contamination namely mining, smelting, manufacturing and recycling activities, and its use in a range of products. Similar to Cadmium, the sources of exposure to Lead contamination are inhalation and ingestion.

Lead is particularly harmful to young children and can cause permanent adverse health impacts, specifically on the development of the central nervous system resulting in reduced Intelligence Quotient (IQ), and behavioural changes. Exposure to very high levels of Lead leads to coma, convulsions and even death. Malnourished children are more susceptible as Lead gets easily absorbed due to deficiency of other minerals such as calcium or iron. Lead affects adults as well and causes symptoms such as anemia, hypertension, cardiovascular diseases, renal toxicity and exposure during pregnancy leads to reduced fetal growth and preterm delivery.

Chromium:

Chromium¹⁵ is found to be 1.2 times higher than the prescribed standards by WHO for soil. Similar to other two elements, Chromium is also a naturally occurring element found in

¹¹ <https://pmc.ncbi.nlm.nih.gov/articles/PMC7312803/>

¹² <https://iris.who.int/bitstream/handle/10665/329480/WHO-CED-PHE-EPE-19.4.3-eng.pdf?sequence=1>

¹³ Ibid 11

¹⁴ <https://www.who.int/news-room/fact-sheets/detail/lead-poisoning-and-health>

¹⁵ <https://wwwn.cdc.gov/TSP/PHS/PHS.aspx?phsid=60&toxid=17>

rocks, soil and plants, etc. Chromium is found in combination with other elements and the three most common forms are chromium(0), chromium(III), and chromium(VI).

While small amounts of Chromium(III) is required for humans, exposure to high levels leads to adverse health impacts. The sources of exposure to chromium are inhalation, ingestion and dermal contact. **The most common form of health impact is on the respiratory system.** Ingestion of Chromium(VI) is found to cause impacts on stomach, intestine, blood and male reproductive system in animals. Additionally, the International Agency for Research on Cancer has identified Chromium(VI) as a human carcinogen.

Findings Regarding The Operation Of The Incinerator

A casual visit to the incinerator can reveal much information about the impunity with which the plant is operated. During our visit to the incinerator it was found that the **air pollution control equipment was completely dismantled and not operational (Fig 4)**. The leachate generated during the process was not treated using the leachate treatment plant as it was also non-functional. The **leachate** generated from the incinerator was **directly discharged** outside the facility causing further pollution (Fig 5 & 6). Furthermore, the operators were running the plant without any proper safety gear such as gloves, aprons and masks which posed severe **occupational health hazards** for them. Interaction with the plant operators revealed that the plant has been functioning under dismal conditions ever since they were employed for work.



Fig 4: Damaged and non-functional air pollution control system



Fig 5: Non-functional leachate treatment plant



Fig 6: Untreated toxic leachate discharged directly into the drain

Regulatory Issues Of The Incinerator Installed By MAK India Pvt Ltd

The claims made by the incinerator installed by MAK India Pvt Ltd seem to be extremely dubious in nature. The first claim of using “Zero waste disposal technology” is completely misleading because the plant produces hazardous bottom ash, fly ash, leachate and toxic fumes which cause severe pollution and health impact and is classified as a “red category”

industry by the CPCB¹⁶. Furthermore the **test reports** uploaded on the company website are completely **misleading**. For example, the gas test report uploaded on their website merely shows the test results for PM, SOx, NOx etc¹⁷ while completely omitting the most important HCL, Cd, Hg, Th, Dioxins and Furans tests which are mandated by the CPCB¹⁸. Similarly, the ash test reports¹⁹ uploaded on their site completely omits the test of heavy metals which are most toxic in nature and mandated by the CPCB rules. The company is also engaged in making **dubious claims** in popular news channels such as Dinamalar²⁰ which have a subscriber base of 3.07 million on their youtube channels apart from millions of other live viewers. According to the company proprietor Manikkam, their **patented “amma technology”** or “blowing technology” can “**convert dioxins into CO2**” and generate “**carbon valued at several crores/kilogram and used for manufacturing aircraft components**” *free of cost* during their incineration process. The company further goes on to claim that it can make 6,000 tons of garbage generated in Chennai and 1,200 tons of Coimbatore into “zero waste” within 24 hours using their technology! In simple terms, this could be labelled as “**technology fooling**” or “**greenwashing**”²¹. Making such false claims should **ideally attract legal penalties under the Consumer Protection Act, 2019**²².

RTI applications filed with the GCC to verify the claims made by MAK incinerators were rejected twice citing irrelevant clauses. Since the GCC was unresponsive to our queries, we looked into the Ministry of Environment Forests and Climate Change (MoEFCC) website²³ to see if they had granted any clearances to the incinerator plant since it is categorized as a “red category” highly polluting industry. Furthermore, we looked into the State Level Environment Impact Assessment Authority (SEIAA) website²⁴ and the Technical Subcommittee meeting minutes of the Tamil Nadu Pollution Control Board (TNPCB)²⁵ for details about the incinerator. We found no information about the incinerator. The 2021 annual report of the TNPCB on the implementation of the Solid Waste Management Rules, 2016 revealed that Tamil Nadu had sanctioned 57 incinerators to burn 1716 tons of garbage per day out of which 19 incinerator plants were already established.²⁶ However, **none of the plants were given consent to operate by the TNPCB** because it could not verify the new technology used by the company. Interestingly the TNPCB annual reports of 2023 and 2024 do not mention about the existence of any incinerator within Tamil Nadu²⁷. Based on these findings, we concluded that the plant has been **operating without the consent to establish and consent to operate from the TNPCB since 2019**. A field visit to one of the incinerators established by MAK in Salem found that it was in a dilapidated condition and non-functional. Discussions with Salem corporation officials who chose to remain

¹⁶ <https://shorturl.at/Y10q9>

¹⁷ <https://makincinerator.com/wp-content/uploads/2019/01/GAS-TEST.pdf>

¹⁸ <https://kspcb.karnataka.gov.in/sites/default/files/inline-files/SWM-Rules-2016.pdf>

¹⁹ <https://makincinerator.com/wp-content/uploads/2019/01/ASH-TEST.pdf>

²⁰ <https://www.youtube.com/watch?v=MriXy9Hgd98>

²¹ <https://pib.gov.in/PressReleasePage.aspx?PRID=2064963>

²² https://ncdrc.nic.in/bare_acts/CPA2019.pdf

²³ <https://environmentclearance.nic.in/>

²⁴ <https://seiaa.tn.gov.in/en>

²⁵ <https://tnpcb.gov.in/tsc.php>

²⁶ https://tnpcb.gov.in/PDF/Waste_Mngt/Solid-wste/AnnualRptSolidwaste2021.pdf

²⁷ <https://tnpcb.gov.in/municipalSolidWaste.php>

anonymous revealed that the **plant operator** had failed to get consent to operate from the TNPCB and had **completely abandoned the two incinerator plants in Salem** (Fig 7). The **status of the rest of the 57 incinerators established in various parts of Tamil Nadu using hundreds of crores of public money remains to be verified.**



Fig 7: Non-functional incineration plant in Salem

Limitations And Future Research

1. One of the major complaints raised by the residents were respiratory issues caused by the toxic fumes emanating from the plant. Attempts to monitor the emissions from the terrace of the residents were thwarted by the plant operators and the residents who supported our monitoring were also threatened because of which air samples could not be collected.
2. Similarly the underground water samples could not be collected because the community was terrified at being targeted by the operators.
3. Dioxins and furans, the most carcinogenic chemicals known to humans, could not be tested, though incinerators are classified as its major source²⁸. Unavailability of such sophisticated testing facilities locally and prohibitive costs associated with the same dissuaded us from proceeding with the testing of dioxins and furans.
4. The untreated leachate generated from the incinerator is let out in the open area and continues to contaminate the nearby pond and groundwater. However, the fact finding team could not collect the leachate due to the high risk involved.

A comprehensive soil, leachate, water and air testing for all the parameters stipulated by the Central Pollution Control Board (CPCB) by a government appointed committee could reveal the stark reality of the “green” incinerators and the extent of the impacts on the environment and community health.

²⁸ <https://shorturl.at/dLRRA>

Significance And Implications

The environmental, health and regulatory issues of the 10 ton/day incinerator in Manali have been well established through our fact-finding mission and it could be an eye-opener for the policy makers. Policy makers always look for silver bullets- technologies such as incineration that will solve the waste management problem. However it is not uncommon to discover later that the silver bullet itself causes more severe problems as in the case of the Manali incinerator. While Chennai is already grappling with the impact of another 50 ton/day incinerator in Kodungaiyur, it comes as a shock that in the budget 2025, the Tamil Nadu government has announced the establishment of two new incinerators a.k.a “waste to energy” (WTE) in Kodungaiyur and Tambaram to burn 2,100 tons and 1,500 tons of unsegregated MSW respectively on a daily basis. The 2,100 ton/day incinerator in Kodungaiyur is planned at a whopping **cost of Rs.3,450 crore²⁹ making it the costliest way to manage garbage in the country.** Furthermore, the **government has proposed to establish large scale incinerators in Coimbatore and Madurai too.** The proposed WTE incinerators in Chennai will emit about 6,120 tons of CO₂ per day³⁰ which is equivalent to the emissions³¹ from about fifteen lakh thirty thousand (15,30,000) passenger cars.³²

Delhi MSW Solutions which has been shortlisted for establishing the incinerator plant in Kodungaiyur, is **notorious for various environmental violations** across the country. Delhi MSW Solutions, a subsidiary of the Ramky group was slapped a **fine of rupees 5,00,000 by Delhi Pollution Control Committee (DPCC) for releasing 490% more dioxins and furans**, twice the amount of PM 10³³ etc. Furthermore, an inspection by CPCB revealed that the dissolved solids and chloride content in the leachate were about three times higher than the prescribed limits of 2100 mg/l and 600 mg/l³⁴. Ramky also operates an incinerator in Virudhunagar and has been pulled up by the **Madras High Court** for its alleged pollution and health impacts in 12 panchayats of Virudhunagar³⁵. An inspection of the Ramky incinerator facility by the Tamil Nadu Pollution Control Board (TNPCB) officials, revealed that even after the High Court had reprimanded it in 2017, the company **had not even installed the dioxin and furan control equipment** as of July 2021³⁶. The TNPCB had also levied a **fine of rupees 3,15,000** on Ramky for violation of various environmental regulations.³⁷ **Being oblivious to the issues with the WTE incineration technology and the technology provider is at its heart, dishonest.**

A thorough **5 year investigation** conducted by the **New York Times** on a WTE incinerator in Delhi (with a capacity of 1950 tons/day) using 150 samples and working with experts at the Indian Institute of Technology Delhi (IIT-D) and scientists at Johns Hopkins University

²⁹ https://cms.tn.gov.in/cms_migrated/document/docfiles/budget_speech_e_2025_2026.pdf

³⁰

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/923125/Pollution-inventory-reporting-incineration-activities-guidance-note.pdf

³¹ <https://theicct.org/wp-content/uploads/2021/06/India-PV-fuel-consumption-052020.pdf>

³² https://drive.google.com/file/d/19kAajQd1K0FcWh_VA43m7-6fuRP0yB6k/view?usp=drive_link

³³ https://cpcb.nic.in/uploads/MSW/Reports_swm_6.pdf

³⁴ https://cpcb.nic.in/uploads/MSW/Reports_swm_6.pdf

³⁵

<https://www.thenewsminute.com/tamil-nadu/tn-s-virudhunagar-residents-share-horrors-living-near-bio-waste-treatment-unit-160590>

³⁶ <https://drive.google.com/file/d/1oY-CQK4A-8LACJHBEE3RTHRiJGDalh6/view>

³⁷ <https://www.cenfa.org/tnpcb-refuses-consent-to-operate-for-ramkys-bio-medical-waste-incineration-facility/>

revealed that the incinerator had **impacted 1 million people**³⁸. Delhi burns the largest quantity of plastics in the country according to a report by the Centre for Science and Environment (CSE)³⁹. In the Financial year 2022-2024, the four waste WTE incinerators in **Delhi cumulatively burnt 7,35,840 tons of plastic** which roughly translates into burning of 2000 tons of plastic everyday! **IIT-Madras in a study found that burning plastics is one of the major reasons for the poor Air Quality Index (AQI) in Delhi.**⁴⁰ If there is anything that Chennai can learn from its national capital, it must be how *NOT* to manage waste. Incinerating 3,600 tons of garbage could potentially **impact the health of close to 1.8 million Chennites**. Another important impact of incineration will be on the livelihoods of about **10,000 waste workers** who recycle about 130,000 tons of recyclables annually, accounting for 24% of the city's total volume⁴¹. The announcement of the incinerator in Kodungaiyur was accompanied by the decision to **close 168 decentralised micro composting centres and 88 material recovery facilities** across Chennai establishing the direct connection between incinerators and job losses and prompting the **NGT to initiate a suo moto case**⁴² on GCC. Studies on various incineration technologies has shown that they have failed miserably in India⁴³. Recently, even the **World Bank scrapped the proposal to fund 4 WTE incineration plants in Gujarat** due to its health and environmental impacts.⁴⁴ The countries in the Global North are increasingly moving away from WTE incineration. For example, the **EU has made WTE incineration ineligible for any funding** in all latest granting measures such as the Just Transition funds, the regional development and the cohesion fund and the EU taxonomy of sustainable finance⁴⁵. Between **2000 and 2024, 53 incinerators have shut down in the USA** and no new incinerators have been built in a new site since 1995⁴⁶ – and yet the Tamil Nadu government is building more!

WTE incinerator is pushed to the public with the *only information* that it produces electricity from waste. But *exformation* (data that is collected but left to gather dust and rot) about its health, environmental, social, climate and financial impacts which are crucial for decision making are conveniently excluded from public purview. There is only one truth about the waste-to-energy technology: it is a waste-of-energy! Even the **CSIR-NEERI report** notes that, **“Promoting WTE incineration plants for mixed waste (mass burning), defeats the purpose of waste segregation, which is mandatory, as per the prevailing**

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<https://www.nytimes.com/2024/11/09/world/asia/india-air-quality-trash.html?smid=nytcore-ios-share&referrerSource=articleShare>

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<https://www.cseindia.org/epr-portal-insights-a-deep-dive-into-india-s-centralized-portal-for-plastic-packaging-12443>

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<https://www.newindianexpress.com/cities/delhi/2021/Jan/28/burning-plastic-major-cause-of-hazefog-in-delhi-iit-study-2256006.html>

⁴¹ <https://development.asia/insight/understanding-potential-informal-waste-recycling-chennai>

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<https://www.dtnext.in/news/chennai/ngt-issues-notice-to-tnpcb-gcc-on-closure-of-micro-composting-centres-in-chennai-826664>

⁴³ <https://shorturl.at/mt97x>

⁴⁴ <https://www.cenfa.org/victory-for-public-health-and-the-environment/>

⁴⁵ <https://www.no-burn.org/wp-content/uploads/ADB-draftenergypolicy.pdf>

⁴⁶ <https://www.energyjustice.net/incineration/closures.pdf>

SWM Rules, 2016. The mass burning of MSW also defeats the opportunity of Circular Economy for the waste sector and may not be feasible for waste in India.”⁴⁷

Recommendations:

Based on the above findings the fact-finding team comprising of Civil Society Organisations (CSOs) and experts urge the state government to:

1. **Constitute an independent committee** to thoroughly probe into the environmental, health and regulatory violations by the 10 ton incinerator in Manali, Chennai.
2. To take **immediate legal action against the 10-ton incinerator operator in Manali** for various environmental and regulatory violations. Other incinerators by MAK India/ other companies in Tamilnadu need to be scrutinized and the companies flouting environmental norms should be penalized.
3. **Scrap the proposed WTE incineration project in Kodungaiyur and Tambaram** which will cumulatively burn 3,600 tons of unsegregated MSW or more than 50% of the waste generated in Chennai which could **potentially impact the health of 1.8 million people**.
4. Focus on **systemic transformations** in the waste management sector including **capping the production of Single Use Plastics (SUPs), lower consumption, source segregation, and decentralized waste processing**.

⁴⁷ https://drive.google.com/file/d/1bOducT5gZO3EtekSe7rD-76BkNloV34X/view?usp=drive_link

Annexure I

Lab Results For The Sample Collected Near The Incinerator



TAMILNADU TEST HOUSE PRIVATE LIMITED

www.tamilnadutesthouse.com

TEST REPORT

TEST REPORT NO: TNTH/M-8655/2024-25

DATE:19.03.2025

SAMPLE SUBMITTED BY CUSTOMER

S. NO	PARAMETERS	METHOD	UNITS	RESULTS
1	Lead	by ICPMS	mg/kg	101.8
2	Chromium		mg/kg	116.63
3	Cadmium		mg/kg	19.22
4	Mercury		mg/kg	0.05
5	Arsenic		mg/kg	1.83
6	Total Organic Carbon	In house method	%	0.14

*****END OF THE REPORT *****

For Tamilnadu Test House Private Limited

Verified By

Authorised Signatory

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