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5th September 1958 - 17th May 2021

HCFI DR KK AGGARWAL RESEARCH FUND

HCFI Round Table Environment Expert Zoom Meeting on “Biomining of Dumpsites, Bioremediation of Legacy Waste, Utilization and Pollution Control Aspects”

- Urban India accounts for one-third of India’s population and generates 55 million tonnes of municipal solid waste annually. A major part is being dumped in the open since long time. There are three landfill sites in Delhi: Ghazipur, Okhla and Bhalswa. These dumpsites pose a threat to public health and the environment because they have grown in height and have become a huge source of pollution and greenhouse gas emissions, such as methane and other landfill gases.
- It is estimated that more than 10,000 hectares of land in India is locked in these dumpsites.
- The legacy waste in these dumpsites amounts to several lakhs of tonnes and needs to be remediated to make the city cleaner.
- It affects the health of people living around it, causes air pollution and the ground water also gets contaminated through leachate.
- The National Green Tribunal (NGT) in its order has also said that the legacy waste needs to be cleaned by biomining and bioremediation.
- This topic is critical in present times because unlocking the land which is lying under the dump is a very important activity. But at the same time, what are the steps to be done and how it can be helpful is also important.
- The government is willing to take this activity under the Swachh Bharat Mission.
- A lot of guidelines by Central Pollution Control Board (CPCB), CPHU have been published. But these guidelines need to integrate the practical problems.
- Government of India, under the phase 2 of the Swachh Bharat Mission, has declared 15,000 lakh crore for the Swachh Bharat Mission. A considerable amount will be spent to unlock the legacy waste or the dumpsites.
- A 35-year-old dumpsite spread across 332 acres of land in Hyderabad was handed over (contract) to us in 2010 with the objective to reclaim roughly 55 acres of land to construct a landfill and other processing plants in the reclaimed land. Fresh waste intake at that time was 3,500 tonnes, which today is 8,000 metric tonnes per day. About 125 acres of land could be reclaimed. Part of it was capped. A huge compost plant, 19.8-megawatt power plant, a compressed biogas plant were constructed, which are all operational. This has been a successful case

study of reclaiming the land and utilizing it for scientific landfill, pre-processing of waste and also recovery of certain materials with 80% of waste going under capping.

- The kind of waste that is generated and the nature of problem is humongous and beyond our imagination.
- Nearly 55 million tonnes of municipal solid waste from urban areas had been open-dumped historically.
- Today there are 10 cities with a billion population. The accelerated growth of population and increasing economic activities rule out the viability of open dumping.
- Environmental adjudication has also mandated the scientific remediation of dumpsites.
- Dumpsites generate leachate that kills vegetation and irreversibly pollutes groundwater. They also generate methane, which often auto ignites.
- The number of legacy dumpsites in India, as of 2020, is 3075 with Uttar Pradesh having the maximum number at 601, followed by Madhya Pradesh (328) and Maharashtra (327).
- Fifty dumpsites in Madhya Pradesh, 15 in Karnataka and 6 in Kerala have been reclaimed. One dumpsite each in Meghalaya, Rajasthan, Telangana and Chandigarh and 6 in Karnataka have been converted to secured landfill facility (SLF) and capped.
- NGT has directed bioremediation of all dumpsites by October 2020. NGT discourages capping or using the land for activities other than waste management.
- CPCB has been directed to prepare inventory of dumpsites as per NGT order and to compile information on legacy sites and identify gaps. The inventory has been prepared and gap studies have been done.
- The Ministry of Housing and Urban Affairs has said that more than 14 billion tonnes of waste is lying with 472 cities and number of dumpsites are 517.
- The solid waste management rules talk of bioremediation. As per the Rules, the local body is the authority. Capping is permissible in case of absence of potential of bioremediation and also reduction by biomining and placement of residues in new SLF. Any new dumpsite can have a new SLF capping with geomembrane, cut off walls or any other method.
- It is required to provide total number of dumpsites and number of dumpsites bioremediated/capped in annual report filed to CPCB. Inventory is the responsibility of the local authority and bioremediation and capping to be completed by March 2021.
- Timelines have been defined and what actions to be done by the urban local bodies (ULB) have been mentioned in the rules. In compliance with the Hon'ble NGT orders, guidelines on "Disposal of Legacy Waste" was to be prepared by CPCB, which have been prepared and the guidelines are uploaded on CPCB website.
- NGT has been quite vocal and directive in terms of where biomining and bioremediation is possible, which can be *ex-situ* or *in-situ*. It says capping of legacy wastes, which has huge environmental and health consequences is no option at all except inert waste, which is to be disposed in a scientific secured landfill.
- Inert waste has not been defined. The utilization of recoverable material has also not been defined. Bioremediation and biomining of dumpsites should be the preferred option and cities with more than 10 lakh population need special localized solutions.
- Duties and responsibilities of local authorities have been defined namely, desired objective of zero waste going to landfill, feasibility studies on open dumpsites and existing operational dumpsites for biomining and bioremediation potential, initiate necessary actions to biomine or bioremediate the sites.
- In the absence of the potential of biomining and bioremediation of dumpsite, it shall be scientifically capped as per landfill capping norms to prevent further damage to the environment.
- Impacts are high in terms of groundwater, water pollution, air pollution (SPM). These dumpsites do not have liner system; so lead to groundwater contamination. There is uncontrolled leachate generation and lack of systems to collect and treat.
- There is no provision of gas collection utilization. Fresh waste continues to be dumped at legacy dumpsites.
- There are some issues related to biomining. Utilization of appropriate machinery and process is not defined. Use of bioculture for stabilization of waste is kept open and the chemical used add to the pollution. Screening of different fractions

requires varied machinery, which need to be carefully checked. Other important issues include management of existing leachate under the dump while doing bioremediation and proper record or documentation of utilization or disposal of screened fractions from biomining.

- There are gaps in planning, data, technical guidance and execution or use of outputs. There is little or no planning prior to dumpsite rehabilitation. There is lack of data on characteristics of waste, bore hole testing, leachate and gas generation from dumpsite.
- There is a need for training of ULBs, State Pollution Control Boards (SPCBs), state Urban Dynamometer Driving Schedule (UDDS) for thorough checks and audits of disposal of the proceeds from biomining. This is a very critical requirement.
- The CPCB has issued directions to SPCBs/ Pollution Control Committees (PCCs) in January 2021 for complete listing of dumpsites, along with bioremediation in compliance with solid waste management Rules and CPCB guidelines, analysis of screened fractions before their utilization or disposal, leachate management, preparation of time targeted actin plan and very importantly, the maintenance of record for utilization/disposal of screened fractions, but it has not been defined. The CPCB has also directed to develop at least one model for bioremediation of dumpsite.
- Biomining is not relocation of a dumpsite. There are complex technical, economic and environmental considerations. Real estate redevelopment potential needs to be carefully evaluated.
- Dumpsite processing has an impact on people living near the dumpsite due to dust and noise pollution. Malodors from the biomining process can affect the surroundings as well as the worker. Masking chemicals may also generate alternate pollution. The movement of heavy machinery is also an issue.
- Each dumpsite cannot be same. Hence, waste characterization is a precursor to the selection of right technology for processing. Capex for technology cannot be arrived at without the characterization of waste.
- Theoretical and actual quantity of waste must be determined rather than relying on visual inspection/total station survey. The densities of all the waste components need to be determined to arrive at the right processing cost of the waste.
- Economics of project completion is more dependent on developing new and instant markets for any new products of the legacy waste other than the regular products (Refuse Derived Fuel [RDF]/ Enriched Soil/Compost, etc.)
- Carbon footprint of transportation is dependent on the design and scale of operations.
- Transportation is very important.
- The proceeds from the biomining are dependent on the age of the dumpsite. The waste in the legacy dumpsite stabilizes with age. The components of biomining are in the form of compost/RDF/inerts/ recyclables. Inerts are very high sometimes and can be more than 70%. Recyclables are negligible.
- Sustainable proceeds from the legacy dumpsite can only be determined by a proper scientific characterization of waste.
- Challenges encountered in dumpsite remediation projects include operational, infrastructural, contractual and financial challenges. Risks need to be properly defined. Land unlocking should have proper support from the ULB or the government.
- 100% land reclamation is difficult for large dumps.
- Clearing land is required for setting up of the biomining equipment within dumpsite for maneuverability of the equipment.
- Other operational challenges are existing litigation on project or land, opposition from local public, lack of clarity on volume vs. weight-based measurements, provision of power and water connections for the project, lack of familiarity with CPCB guidelines, delay in processing due to climatic conditions. Difficulty in quantifying the legacy waste below ground level is another challenge. Therefore, separate methodology has to be worked out to assess the quantity which needs another project. Guidelines need further detailing with the help of experts.
- Transportation costs can be more than the cost of remediation itself.
- For smaller ULBs of less than 1 lakh population, farming areas are close by so that mined soil enricher is taken by the farmers. But they are reluctant; so confidence building measures are required to remove hesitancy. Inerts are also used up by ULBs and citizens in building activities such as construction of drains, footpaths.
- Transportation of RDF from these ULBs to the points of usage, such as cement kilns, road

- projects and Waste-to-Energy (WtE) plants, can be a costly task as the amount of RDF is small.
- The linkages for off take of by-products, like soil enricher, RDF, C&D waste, recyclables and inert to farmers, are still a big challenge for ULBs or operators in providing sustainable solution of dumpsite remediation.
 - Customized machineries are not available for removal of legacy waste.
 - There is a lack of experienced workers for carrying out biomining work. There is no incentive or reward for carrying out this work since the contractors have to work in unhygienic and hazardous dump yards.
 - Cement companies are reluctant to take the RDF. Cost-benefit analysis has to be done.
 - Unreasonable timelines proposed by ULB, lack of clarity of PCBs clearances are other issues of concern.
 - Mostly, biomining projects are under budgeted; there are no grants or financial assistance from government.
 - The ULBs could not bear the entire biomining cost from their own resources.
 - Payment terms and methodologies vary with different ULBs. There is lack of clarity on the applicability of GST.
 - The cost burden for transporting the soil and inerts is much higher than the cost of the remediation itself.
 - Biomining is a complex problem and needs to be aligned with an integrated Solid Waste Management (SWM) approach. There is no one size fits all as each dumpsite has its own characteristics. The biomining proceeds vary, which affect the disposal routes. The best strategy has to be selected to address the legacy dump.

Participants: Dr Anil Kumar, Mr Vivek Kumar, Mr Sanjeev Kumar, Mr Premchandras, Dr M Dwarakanath, Mr Arun Kumar, Mr Neeraj Tyagi, Mr Vikas Singhal, Mr Ankit Sethi, Mr Varun Singh, Ms Ira Gupta, Dr S Sharma

(Excerpts from presentation by Mr Sanjiv Kumar, Vice President, Ramky Enviro Engineers Ltd.; February 20, 2022 - 12 noon-1 pm)



FDA Authorizes New Monoclonal Antibody to Treat Omicron

The US Food and Drug Administration (FDA) has issued an emergency use authorization (EUA) for bebtelovimab, a monoclonal antibody that has been reported to retain activity against the Omicron variant.

Bebtelovimab has been granted EUA for the treatment of mild-to-moderate COVID-19 in people aged 12 years and above, who have a risk of progression to severe disease. The agency stated that laboratory tests have shown that bebtelovimab retains its activity against both the Omicron variant and the BA.2 Omicron subvariant.

The antibody treatment has not been approved for use in hospitalized patients or those who need oxygen therapy, as it has not been evaluated in this population and could possibly worsen the outcomes. The EUA is supported by results from the phase II BLAZE-4 trial.

The agency stated that COVID-related hospitalizations and deaths were found to be lower among patients who received bebtelovimab alone or in combination with other antibodies compared to those who were given placebo... *(Medpage Today, February 11, 2022)*

Coronavirus can Destroy Placenta, Cause Stillbirths

According to new research, the coronavirus can potentially invade and destroy the placenta and result in stillbirths in infected women. Investigators in 12 countries, including the United States, examined placental and autopsy tissue obtained from 64 stillbirths and 4 newborns who died soon after birth. All the cases involved unvaccinated women who contracted COVID-19 infection during pregnancy. Jeffery Goldstein, a pathologist at Northwestern University's Feinberg School of Medicine, said that the study indicates that damage to the placenta, rather than an infection of the fetus, likely leads to COVID-19-related stillbirths.

Study lead author, Dr David Schwartz, said that in many of the cases, more than 90% of the placenta was destroyed. The study is published in *Archives of Pathology & Laboratory Medicine...* *(Deccan Chronicle – AP, February 11, 2022)*