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WHITE BLACK LEGAL is an open access, peer-reviewed and refereed journal providededicated to express views on topical legal issues, thereby generating a cross current of ideas on emerging matters. This platform shall also ignite the initiative and desire of young law students to contribute in the field of law. The erudite response of legal luminaries shall be solicited to enable readers to explore challenges that lie before law makers, lawyers and the society at large, in the event of the ever changing social, economic and technological scenario.

With this thought, we hereby present to you

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EFFECTIVE UTILISATION AND MANAGEMENT OF FLY ASH IN INDIA

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SASTRA DEEMED TO BE UNIVERSITY

INTRODUCTION:

Fly ash, a by product of coal combustion, has emerged as a significant resource in various industries and environmental management practices. Fly ash is primarily generated during the combustion of coal in thermal power plants. It consists of fine particles that are carried away by the flue gases and collected through electrostatic precipitators or other pollution control devices. In India, where coal is a dominant source of energy, the production of fly ash is substantial, amounting to millions of tons each year. Nearly 75% of India's total installed power generation capacity is based on coal. Hence, Fly ash is produced on large scale during Power generation. In India, the government has recognized the importance of fly ash and has taken initiatives to promote its utilization. Policies and regulations have been implemented to encourage the mandatory use of fly ash in construction projects, thereby reducing the environmental burden associated with waste disposal. Various research and development programs are also being conducted to explore innovative applications and ensure sustainable management of fly ash resources. In this paper, we will explore the applications, environmental effects, effective utilisation and management of fly ash in India.

APPLICATION OF FLY ASH:

Soil Texture: Fly ash improves the physical and chemical properties of problematic soils. Therefore, it can be used as soil ameliorant for waste land reclamation and abandoned mines. It's important to note that the application of fly ash for soil texture improvement should be done in accordance with local guidelines and recommendations. Fly ash should be properly tested for its chemical composition and heavy metal content to ensure it meets the required standards for safe agricultural use. Additionally, the appropriate quantity and depth of fly ash application should be determined based on soil type, crop requirements, and environmental factors.

Water holding capacity: Fly ash can be used to make the soil to be stable and enhance the water holding capacity of soil. By incorporating fly ash into the soil or using it as a soil amendment, farmers and gardeners can improve the water holding capacity of soils, reduce water runoff, and promote more efficient water use in agricultural and horticultural systems.

Construction of roads: As a better fill material, denser concrete with greater ultimate strength and durability. The utilization of fly ash in road construction offers compelling advantages, including improved material performance, cost-effectiveness, environmental sustainability, and increased road lifespan. By harnessing the potential of fly ash, we can build roads that are not only structurally robust but also environmentally friendly.

Fly ash as bricks: Fly ash is indeed commonly used in the production of bricks. The fly ash based bricks are known to have higher compressive strength and are lightweight. the utilization of fly ash in the production of bricks offers environmental benefits, improved brick characteristics, cost-effectiveness, and energy efficiency. These factors have contributed to the widespread adoption of fly ash bricks in the construction industry.

Fly ash as cement: Fly ash is commonly used as a supplementary cementitious material (SCM) in the production of cement. Fly Ash is used as an admixture to improve upon the performance of concrete and lowering the cracking potential. It will lead to reduction in cost of construction. fly ash can be effectively utilized as a supplementary cementitious material in cement production. Its pozzolanic properties, improved concrete performance, environmental sustainability, and cost-effectiveness make it an attractive option for reducing the environmental impact and improving the overall quality of cement-based materials.

Metal recovery from fly ash: Metal recovery from fly ash refers to the process of extracting valuable metals from the ash generated by coal combustion in power plants. Fly ash typically contains small amounts of various metals, including but not limited to aluminium, iron, copper, zinc, and rare earth elements. metal recovery from fly ash provides an opportunity to extract valuable metals from a waste stream generated by coal combustion. This process contributes to resource conservation, reduces the environmental impact of metal extraction, and may have economic benefits through the utilization of

recovered metals in various industries.

ENVIRONMENTAL EFFECTS OF FLY ASH:

Air pollution: Fly ash, a byproduct of coal combustion in power plants, can contribute to air pollution if not properly managed. Uncontrolled emissions of fly ash can contribute to air pollution. Fly ash particles, especially the fine fraction known as PM_{2.5}, can be released into the atmosphere during coal combustion or during the handling and transportation of fly ash. Inhalation of these particles can have negative impacts on air quality and human health causing severe respiratory diseases, cancer, stroke, etc.

Soil pollution: If fly ash is not adequately managed, it can contribute to soil contamination. Leaching of heavy metals and other contaminants from fly ash can contaminate soil, potentially impacting soil fertility and hindering plant growth where it affects the root development in plants.

Water pollution: Improper disposal or storage of fly ash can lead to water pollution. When exposed to water, certain constituents within fly ash, such as heavy metals and trace elements, may leach out and contaminate surface water or groundwater. This can have detrimental effects on aquatic ecosystems, affecting aquatic life and water quality.

Radiation: For an equal amount of electricity generated, fly ash contains a hundred times more radiation than nuclear waste secured via dry cask or water storage.

It is important to note that the potential environmental effects of fly ash can be mitigated through appropriate management practices, including proper containment, storage, and utilization methods. Regulatory guidelines and industry standards are in place to ensure the safe handling, disposal, and beneficial use of fly ash while minimizing its environmental impact.

By implementing effective environmental management strategies and adhering to best practices, the potential negative environmental effects associated with fly ash can be minimized, while maximizing its beneficial applications and resource utilization.

GOVERNMENT MEASURE TO PROMOTE FLY ASH

UTILISATION:

The Government of India has taken several measures to promote the utilization of fly ash in various sectors. These measures aim to address environmental concerns associated with fly ash disposal, conserve natural resources, and promote sustainable development.

- The central electricity authority has been monitoring the fly ash generation.
- Fly ash notification issued under environment protection act 1986, mandates the individual thermal plant to upload details of fly ash availability on thermal power station's website.
- Mandatory use of fly ash based products in all government schemes. **Pradhan Matri Awas Yojana (urban)** has focused on new construction technologies such as using fly ash bricks that are innovative and environment friendly.
- The Goods and Service Tax rate on fly ash and fly ash aggregate with 90% or more fly ash content was reduced from 18% to 5%
- A Web portal for monitoring of fly ash generation and utilisation and a mobile based application titled "ASH TRACK" has been launched by government for its effective management.

These measures collectively aim to increase the utilization of fly ash in India, minimize its environmental impact, and promote sustainable development. The government continues to focus on strengthening policies, regulations, and initiatives to create an enabling environment for the effective and widespread utilization of fly ash across various sectors.

FLY ASH MANAGEMENT AND UTILISATION MISSION:

Recently, the National Green Tribunal directed the constitution of 'FLY ASH MANAGEMENT AND UTILISATION MISSION'. Fly ash management and utilization missions are initiatives aimed at addressing the challenges associated with the disposal of fly ash, while maximizing its potential as a valuable resource. These missions focus on effective management practices and the utilization of fly ash in various applications, promoting environmental sustainability and resource conservation.

The order by the national green tribunal takes note of 'Unscientific Handling and Storage' of the fly

ash by coal thermal power stations. For an example; the draining of industrial effluents and fly ash in Rihand Reservoir.

The mission's mandate includes preparation of an action plan on the findings of the committee meeting including storing, handling, management and utilisation of fly ash. Besides, monitoring the disposal of annual stock of unutilised fly ash, will also see how many tonnes of accumulated fly ash could be utilised in the least hazardous manner and how all the safety measures could be taken by the power plant. The mission will be financed through CSR funds, and act as an environmental restoration and compensation fund responsible for relief compensation for affected people.

Fly ash management and utilization missions play a crucial role in promoting sustainable practices for fly ash handling, storage, and utilization. By focusing on environmental management, beneficial use, research and development, and regulatory frameworks, these missions contribute to environmental sustainability, resource conservation, waste reduction, and economic opportunities. Through their implementation, fly ash, which was once considered a waste material, can be transformed into a valuable resource with multiple beneficial applications, leading to a more sustainable and responsible approach to fly ash management.

FLY ASH NOTIFICATION 2021:

Fly Ash Notification 2021 was issued under the Environment (Protection) Act 1986.

- Prohibiting dumping and disposal of fly ash discharged from coal or lignite based thermal power plants on land or into water bodies, the Centre has made it mandatory for such plants to ensure 100% utilization of ash in an eco-friendly manner, and introduced for the first time a penalty regime for non-compliance based on 'polluter pays' principle.
- Under new rules, the non-compliant power plants will be imposed with an environmental compensation of Rs 1,000 per tonne on unutilised ash during the end of every financial year.
- The amount, collected by the Central Pollution Control Board (CPCB) from the thermal power plants, will be used towards the safe disposal of the unutilised ash. It may also be utilised for advancing research on use of ash including ash based products.
- In cases where fly ash is being used in various activities, power plants will have to deliver fly ash at project sites free of cost.

- The power plant may, however, charge for ash cost and transportation as per mutually agreed terms, in case it is able to dispose of the ash through other means.
- The new fly ash notification of December 2021, has made provision for the ‘enforcement, monitoring, audit and reporting’ of the progress of fly ash utilisation and implementation by coal thermal power plants and user agencies.
- The Notification holds the CPCB and State Pollution Control Boards (SPCB) / Pollution Control Committees (PCC) responsible for monitoring the effective implementation of mandates under it.
- However, along with these statutory regulators, the Mission also extends the responsibility of fly ash management to the chief secretaries of the states.
- The Notification mandates the individual thermal power plant to upload monthly information regarding ash generation and utilisation on its web portal.
- The Mission as directed by the NGT, on the other hand, will make the roadmaps and progress in fly ash utilisation available for all thermal power plants and their clusters, on the MoEF&CC website on a quarterly basis for the knowledge of all stakeholders.

CONCLUSION:

Fly ash plays a crucial role in India's sustainable development journey. Its versatility and diverse applications in construction, environmental management, and energy generation make it an invaluable resource. By harnessing the potential of fly ash, India is striving to achieve a more resource-efficient and environmentally conscious future. Effective management and utilization of fly ash in India are of paramount importance for sustainable development and environmental conservation. In order to effectively manage and utilize fly ash, it is essential to ensure proper testing, quality control, and compliance with safety standards. Continued research and development efforts should focus on exploring new applications, technologies, and best practices for fly ash utilization. Collaboration among government bodies, industries, and research institutions is crucial for fostering innovation, knowledge sharing, and effective implementation of fly ash management strategies.

By embracing effective management and utilization of fly ash, India can not only address environmental challenges but also unlock economic opportunities, reduce resource consumption, and pave the way for a sustainable and prosperous future. It is through these concerted efforts that India can harness the full potential of fly ash and contribute to a greener and more resilient nation.