REVIEW OF RESEARCH
ISSN: 2249-894X
IMPACT FACTOR : 5.7631(UIF)

OVERVIEW ON THE EFFECTS OF THERMAL FLY ASH ON HUMAN HEALTH IN PARLI VAIJNATH REGION, BEED DISTRICT. (MS) INDIA

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ABSTRACT:-

The present communication overview the effects of thermal fly ash on human health. Fly ash or flue ash, also known as pulverised fuel ash in the India, is a coal combustion product that is composed of the particulates that are driven out of coal-fired boilers together with the flue gases. Coal fly ash is lightweight particles captured in exhaust gas by electrostatic precipitators and bag houses of coal-fired power plants. Fly ash is very fine with cement like properties and has long been used as an additive in cement, though not without some controversy

Energy requirements for the developing countries in particular are met from coal-based thermal power plants. The disposal of the increasing amounts of solid waste from coal-fired thermal power plants is becoming a serious concern to the environmentalists. Coal ash, 80% of which is very fine in nature and is thus known as fly ash is collected by electrostatic precipitators in stacks. In India, nearly 90 mt of fly ash is generated per annum at present and is largely responsible for environ- mental pollution. In developed countries like Germany, 80% of the fly ash generated is being utilized, whereas in India only 3% is being consumed.

Fly ash, the after-burnt tiny coal dust is a byproduct from the thermal power plants; it is non-reactive inert particle which may remain suspended in the air from few seconds to several months. Till now, the major source of power in India comes from burning of low-quality coal and the country needs more power every day.

In this situation, the evaluation of this ecologically sensitive toxic substance has been assessed in this article in terms of its origin, nature, properties, environmental distribution, impact and possible biological and non-biological significance to draw the deep attention of the environment research explorers in Parli-V. region, Maharashtra ,India. This article attempts to highlight the impacts of fly ash and use of this solid waste, in order to save our environment.

KEY WORDS: *Fly ash, Environmental impact, Fly ash disposal, Biological reclamation etc.*

INTRODUCTION:

In India, electricity is the main source of power for industries. For enormous reserve of coal in the country, coal-based power generation is the major source of energy, and the coal-generated thermal power

stations have been established throughout the country. The need and consumption of power is increasing day by day; in 1991 the total installed capacity of all the thermal power stations was 45,000 MW, in 1995 it went up to 54,622 MW, in 2003 it has reached 1,06,245 MW (NTPC Publication, 2003). About 62% of the coal produced in India is utilized for generation of 65% of total electricity.

The primary effect of fly ash production is the generation of a number of problems, mainly because of its minute size, non-reactive nature, presence of toxic elements and huge production. The 'fly ash mission' aims at innovation of various biological and non-biological utilization procedures, which encompasses a spectrum of workers from road research engineers to forest research scientists. The effect of fly ash in ecosystems, especially on the plants, has drawn up deep attention of the environmentalists during the last few decades.

OBJECTIVES OF THE WORK:

• Use of the fly ash as in agriculture was tested by using fly ash with combination of different types of compost and its effect on chlorophyll and polyphenol which indicate the growth status of the plant.
• The zeolite synthesized from fly ash.
• Recovery of Nickel and Zinc components from fly ash.
• Characterization of fly ash has been carried out for the assessment of its suitability for various applications in various fields and for getting an idea about components present in it.
• The possible reuse of fly ash in its present form and treated form or by synthesizing some byproducts such as the zeolite from the fly ash was tested in laboratory.
• The specific application of fly ash in different fields such as use of fly ash in removing the metallic ions by adsorption and removing BOD, COD and micronutrients from the waste/contaminated water.

STUDY AREA

The Parli is one of the big Tehsil in Beed district located at 90 km South- East of Beed city in Maharashtra State. It is surrounded by Balaghat range of hills. It has the benefited by broad gauge connectivity with other major cities of India from pre-independence period. After independence it became an urja city by establishing thermal power station in the Marathwada region. During the present investigation the Parli thermal power station situated in Parli city of Beed District was selected as a study area for study of reuse, recycle potential of fly ash generated from thermal power station along with the other environmental problems associated with the fly ash.

The fly ash samples were collected from the selected study area. The Parli thermal power plant is situated at latitude 18o52'05.25" North and longitude 76o31'31.80" East (Plate-1). Parli thermal power station was established in 1970 with initial capacity of 40 MW i.e. two units of 20 MW capacities. The three units 210 MW capacity were expanded in the year 1980. The total capacity of the thermal power plant extended up to 670 MW up to 1980. Furthermore the one unit of 250 MW capacities is being installed in subsequent year after 1980 and total capacity extended up to 920 MW. The total area occupied by thermal power plant is extended approximately up to 822.62 hectares.

The need of water supply was fulfill by using the water of Godavari River by constructing the barrage, which are coming from 20 km away from thermal power plant. The Parli thermal power plant is fist thermal power plant established in Marathwada region. This plant having basic installation capacity of 920 MW electricity. The power plant is divided in to 6 units i.e. two small and four large units which generates large amount of ash in the form of bottom ash and fly ash.

Fly ash and bottom ash were generated due to combustion of coal in boiler at high temperature of 1400oC to 1500oC in presence of excess air. The average coal consumption for the generation of 1 MW electricity is about 13 to 15 tons per day. The average ash content generated from coal based thermal power plant is approximately 35 to 40% means 4 to 6 tons per day. Out of total ash generated the bottom ash is

20% and 80% as a fly ash separated in electrostatic precipitators. Large amount of ash is dump in the form of ash slurry in the ash dyke area.

It has been estimated that the daily coal requirement of Parli Thermal Power Plant is about 9500 MT to 10500 MT i.e. 0.80 kg/KWH coal is used for generation of per unit electricity. Burning of such huge amount of coal in the boiler produce large amount of ash, 300 to 400 tons ash generated per day i.e. approximately 11.46 lakh tons per year. The ash generated in the thermal power plant is collected separately. The 9.17 lakh tons of fly ash collected in the form of dry fly ash and 2.34 lakh tons in the form of wet fly ash or in the form of slurry.

The fly ash in the form of slurry was dumped on approximately 4 to 5 km toward north east side of the Parli city near new thermal power plant on Gangakhed road. Very small amount of fly ash was dumped on old fly ash dykes just near to old thermal power plant, which is situated just 2 to 3 km west side to the thermal power plant. The Parli thermal power station area was selected as a study area for the study of environmental problems of fly ash and for the collection of ash samples i.e. bottom ash and the fly ash for the investigating its reuse and recycle potential in the laboratory.

The objectives were worked out with the sample collected from the study area and by studying the environmental problem. The samples of pond ash were collected from the fly ash disposal site situated near the new (extended) unit of Gangakhed road. The samples of surface water and underground water for the calculation of heavy metal pollution index were collected from the adjoining area from the fly ash disposal site at Parli thermal power station.

The impact of fly ash in Parli-V. region are as follows

• Fly ash cannot be disposed-off in the open field because it pollutes the air, soil and ground water. • Transportation of fly ash is difficult since the lightweight particles tend to fly causing air pollution. • Long inhalation causes serious respiratory problems. • Affects horticulture, agriculture and forest fields. • Disposal in river or ponds damage the aquatic life; flyash causes siltation problems. • Long and continuous use of fly ash as fertilizer makes hard underground. • Requirement of huge land for making ash ponds or dikes.

In Parli region several hectares of land is needed per megawatt of installed capacity for a 10 m deep ash pond near the Nagapur and Daunapur village that should last at least 25 years. Therefore, a large area is required for setting the ash ponds; this generates not only a source of pollution but becomes fully unproductive too. The already existing ash ponds need immediate attention for checking the disposal of the contaminants.

There are two basic modes of ash disposal, viz. disposal in slurry form and disposal in dry/conditioned form. However, coal ash used in conjunction with high carbonaceous materials such as sewage sludge, plant and animal manures can be safe for land use.

THE SIGNIFICANCE OF FLYASH MISSION

Flyash has a good potential for being utilized the in agriculture fields in the following manner: • As a soil amendment to modify the pH of the soil. • As a soil conditioner to improve the physical and chemical properties of soil. • As a source of essential plant nutrients. The physical, chemical and mineralogical properties of most of the common soil types and flyash are more or less similar in many respects.

In fact, flyash is superior in some respect with regard to its high water holding capacity (WHC) and low bulk density in Parli V. area . Various cereal crops like paddy, wheat, maize, pulses like pigeon pea, chick pea, etc., vegetables like tomato, potato, brinjal, pea and commercial grasses like berseem, medicinal and aromatic plants were tested.

Depending upon the soil type and its characteristics, flyash up to 560 ton/hectare can be used in agriculture/soil amendment. The above crops have been grown in ash admixed soils at various proportions and the yields of various crops have shown a considerable increase.

The most of the natural elements are present in coal ash in trace amount, addition of flyash changes physical properties, mineral composition and chemical equilibrium of the soil. The minerals contained in flyash may become available to plants after release into the environment. The large output of flyash particles by power plants and subsequent deposition of these on surfaces of vegetation and soils, increase the flux of several elements into the surrounding environment.

CONCLUSIONS:

The scanning electron microscopic study of fly ash particles concludes that, the fly ash is fine spheroid particles with comparatively high adsorbing surface area. - The pH of fly ash is slightly alkaline in all the types of fly ash samples. - The fly ash consist oxides of silicates and aluminates as major contents in all the type of fly ash samples. The removal of nickel and zinc at optimum rate was near the neutral pH value i.e. up to 7.2. The fly ash can be used as soil conditioning agent along with the compost and helps for increasing the growth of crop plants.

- The disposed fly ash may contaminate the surface and underground water resources in vicinity of fly ash disposal site.
- Heavy metal pollution index can be acts as baseline information for monitoring the future change in metallic constituents in surface and underground water resources.
- Fly ash can be converted in to zeolites.
- Synthesized zeolites from fly ash can be used for the treatment ofn wastewater, which reduces BOD, COD and dissolved nutrient up to some extent.
- Recommendations:
- Fly ash is to be disposed at well identified disposal site with employing scientific methods.
- The disposal site of fly ash should be significantly away from water resources to avoid the contamination.
- To reduce the load on fly ash disposal site, the ESP fly ash is to be reused efficiently.
- To promote reuse and recycle of the fly ash research and development (R & D) activities to be promo
- . A lot of emphasis is being laid on the biological and non-biological utilization of flyash. As the physico-chemical properties of flyash depends on the type and nature of coal burnt, its special effect with respect to the particular affected areas, especially on the vegetation, is a matter of concern in Parli Vaijnath region in Beed District.

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