Air and Noise Pollution Management of Asphalt and Concrete Mixing Plants

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This paper focuses on the environmental evaluation of asphalt and concrete mixing plants involved in Highway construction. During the preparation of asphalt concrete and cement concrete, air samples have been collected and analyzed as per the standard analytical procedure recommended by the Central Pollution Control Board for the quantification of $PM_{2.5}$, PM_{10}, SO_x, NO_x and CO. Noise levels also were taken from the activities carried out in the plants. Particulate matter was found to be significant pollutant from the plants. The average concentration of particulate matter $PM_{2.5}$ and PM_{10} were 86.375 µg/m^3 - (2.16 times of standard $PM_{2.5}$) and 146.50 µg/m^3 (1.465 times of standard PM_{10}) in downwind direction of hot mix asphalt plant site. In concrete mixing plant site, the average concentration of particulate matter $PM_{2.5}$ and PM_{10} were as 111 µg/m^3 - (2.77 times of standard $PM_{2.5}$) and 181 µg/m^3 (1.81 times of standard PM_{10}) in downwind direction. Since the plants handling huge quantity of raw materials, particulate matter was emitted from various processes, such as transferring of materials from truck, handling of minerals into hopper and drum mixer and also from open stock pile of minerals, unpaved road dust emission, particulate matter emission was significantly higher than the permissible limits. Moreover, the maximum sound level recorded in hot mix asphalt plant site and concrete mixing plant site were 77 dB (A) and 88 dB (A), respectively. Regular light watering on the significant sources, paved roads, green belt development and sheet enclosure to open stock piles were suggested to suppress the formation of particulate matter.

Geotechnical Properties of Flyash Used in Construction of Road Embankment

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Increased demand for electricity caused an increased in production of flyash. It has been considered as hazardous waste. At present, about 85 thermal power stations produce nearly 118 million tonne of coal ash per annum and it is estimated that the coal ash production will reach 175 million tonne by 2012 and may exceed 225 million tonne by 2017.The solution to this problem (high amount of ash production) lies in gainful utilisation of flyash. The flyash can be utilized in bulk only for engineering purposes, such as construction of dams, embankments, airport runways, highways, building materials and civil construction. The consistency and abundance of flyash in many areas present unique opportunities for use in road embankments. The purpose of this paper is to review the geotechnical

properties of the flyash and the construction methods that have been considered in road embankment.

Biomonitoring of Air Pollution Near Parichha Thermal Power Plant, Jhansi, Uttar Pradesh

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Lichens are excellent bioindicators. As bioindicators, the presence/absence of sensitive species is pointer to use for distribution patterns of air pollutant deposition. The accumulation of various air pollutants including heavy metals by lichens is well documented (Ferry *et al.,* 1973). Pollutants, like SO_2 and NO_2 affect the growth of lichens and its colony. Sometimes the lichens which are sensitive can die or shift their colony. This shows the presence of air pollutants in the air. The resistant lichens accumulate the heavy metals and air pollutants in their thallii. In Indian context, a survey of the lichen of 25 Kolkata streets demonstrated that the species and population of lichens could be an indicator for determining the air quality (Das *et al.,* 1986). Upreti and Pandey (1990, 2000) studied the concentration of heavy metals in lichen growing on different ecological habitat in Schirmacher Oasis. The sampling of lichen and air pollution monitoring were carried out during the month of April to July 2007 in and around the Paricha Thermal Power Plant, Paricha Jhansi. We have assumed the Paricha Thermal Power Plant as central part and collected samples from all the 4 directions. Samples were also taken from a control location at distance of about 24 km from the Paricha Thermal Power Plant. Concentration of SO_2 and NO_2 in all the monitored locations in all the seasons were found to be well within the prescribed standard. The concentrations of the various pollutants at the control location were found to be less than that at other locations. Heavy-metal accumulation in a few prominent lichens of some localities is also analysed. Chromium was found to be accumulated more in all the species collected.

Evaluation of Feasibility of Utilization of Blast Furnace Waste Flue Dust - Part I : In Sinter Making

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JSW Steel Limited (JSWSL), Salem Works, is an integrated steel plant, which operates 2 sinter plants with a combined production capacity of 1.2 Mtpa (million tonne per annum) of sinter. JSWSL also operates 2 blast furnaces with a combined capacity of 1.0 Mtpa of hot metal and blast furnaces generate approximately 45,000 tpa (tonne per annum) of flue dust. The sinter produced alongwith

other raw material is directly charged into the blast furnace for iron making. The flue dust generated essentially contains unburnt coke and iron rich grains as the value added products. In order to recover these value added products, recycling of flue dust is considered. But the direct recycling of flue dust is not possible as it also contains some undesirable elements, such as zinc and alkali metals (sodium and potassium), which causes operational difficulties in the blast furnace. Laboratory scale leaching experiments were carried out to remove zinc and alkali metals from blast furnace flue dust. The influence of particle size, reaction temperature and sulphuric acid concentration on the removal of zinc were studied. The aim of the present study is to investigate the feasibility of utilization of JSWSL blast furnace waste flue dust by leaching with sulphuric acid to bring down zinc level to below 0.2% with minimal iron loss and recycling it in sinter making facility available in-house. The sinter so produced, if found suitable, is proposed to be used in JSWSL blast furnaces for iron making.

Evaluation of Feasibility of Utilization of Blast Furnace Waste Flue Dust-Part II: As a Substitute for Iron Ore in Cement Making

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JSW Steel Ltd., Salem Works (JSWSL), is an integrated steel plant, which operates 2 blast furnaces with a combined production capacity of 1.0 Mtpa (million tonne per annum) of hot metal. The blast furnaces generate approximately 45,000 tpa (tonne per annum) of flue dust. The flue dust was considered a waste material, as it could not be recycled in-house due to the presence of some undesirable elements, such as zinc and alkali metals (sodium and potassium), which causes operational difficulties in the blast furnace. Hence, to find new applications for this waste flue dust in other industries, studies were carried out alongwith India Cements Limited (ICL), to utilize flue dust as a flux and mineraliser in place of iron ore in cement making. Flue dust was characterized by elemental analysis and x-ray fluorescence (XRF) analysis. X-ray diffraction (XRD) studies were also carried out determine various phases, which constitute flue dust. Burnability studies were carried out to determine its suitability in cement making. The aim of the present study is to investigate the feasibility of utilization of JSWSL blast furnace waste flue dust as a substitute for conventional iron ore in cement making at ICL.

Strategies to Mitigate the Influence of Power Generation on Environment Pollution

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Electric power undoubtedly plays significant role in the development of any country, and so is true for our country. Ours is a country of one billion plus people with fast growing economy, our requirement for power is ever increasing. Moreover, there are thousands of villages where darkness is yet to be dispelled by electricity. To meet our power requirement, we need to establish generating stations which could be conventional, like thermal power, hydel power, nuclear power and non-conventional, like wind power, tidal power or geo-thermal power. Conventional power stations play much bigger role in power generation but give rise to lot of atmospheric contamination and cause air, water and land pollution. Environmental pollution arising out of different types of power stations and strategies to control the pollution has been discussed in this paper.

Environmental Impact and Utilization of Flyash : A Study of Bhushan, Vedanta, Hindalco, IB-Thermal in Jharsuguda and Sambalpur District of Orissa

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To produces 1 Mw power, 14.8 tonne of coal approximately is required, which contains 40% ash in sub-bituminous type coal, from IB-valley area of MCL. Presently Bhushan Power and Steel produce 100 Mw power and the amount of SPM released is 592 tonne of flyash. Simultaneously Vedant Aluminium Limited produces 2400 Mw power, amount of SPM released is 14208 tonne of flyash, IB Thermal Power Plant produces 960 Mw power, amount of dust released is 5683.2 tonne of flyash, similarly Hindalco produces 275.5 Mw power, amount of dust released is 1630 tonne of flyash. So a total of 22113 tonne of flyash is produced to generate 3775.5 Mw of power. For proper disposal of 22113 tonne of flyash, to produce 3775 Mw of power, minimum required land for 20 year as dry disposal is 3020 acre. Data collected from various sources that a large amount of flyash is disposed in different vacant sites of nearby villages which create lots of environmental problems due to improper disposal, as directed by state pollution control board. Simultaneously, for 1 Mw power, amount of nitrogen released is 138 tonne, sulphur of 148 tonne and CO_2 released is 7000 tonne, to the atmosphere. Many thermal power plants have been started by various large scale companies, like Vedanta Aluminium Ltd., Hindalco, Bhushan Power and Steel, IB Thermal Power Plant and many other

coal based power plants, like Indo Bharat, NTPC, etc., are proposed to be established in the coming days in Jharsuguda and Sambalpur district. At present, 3775 Mw of power is generated in Jharsuguda and Sambalpur area. Since coal based power plants are both highly air and water polluting, it is necessary to regulate the thermal power generation activity in the path of minimum environmental degradation. Disposal of flyash is a major problem of coal based thermal power plants. The wet disposal of flyash is cheap to operate, but require more land, so dry disposal should be encouraged with proper planning. Alternate use of flyash, particularly cement making, brick making should be encouraged. Government may invite private entrepreneurs for establishment of more cement plants in Jharsuguda district. Stricter standards for SPM emission and World Bank standards for SO_2 and NOx emission are required to be imposed. It is desirable to prepare regional environmental plants for the whole district of Jharsuguda and Sambalpur based on carrying capacity study because in those areas, a large number of thermal power plants are planned and subsequent expected industrial development.