Welcome Address

I have the honour and pleasure to extend to you all a hearty welcome on behalf of the organisers of the Third All India Conference on Engineering Materials & Equipment sporsored by the Association of Engineers, India. The programme covers topics of great national interest particularly in the fields of communication, textile industries and sociai well being. Being a practising earth scientist for over three decades and in keeping with the occasion I am inclined to speak a few words on "Abatement of Environmental Pollution" a subject which will be discussed in the seminar tomorrow.

Along with modern man and civilisation commenced pollution when he interfered and disturbed the natural balance of the environment. The consequential effects, however, largely remained unnoticed till recently owing to the tolerable level of this interference and natures unceasing efforts in restoring this balance. Subsequent to the post world war II era, the unprecedented growth in Science and Technology, Industrial Revolutions, Popvlation Explosion, added to pollution problem and is continuing to have very high adverse impact on human life particularly in advanced countries like USA, Japan, USSR.

Environmental science comprises the study of air, land, water, energy and life as they exist on this planet and therefore attracrs disciplines such as meteorology, geophysics, oceanography, engineering, ecology and biology. Of the vast spectrum of environmental problems that confront the mankind today probably pollution of the environment by acts of man ranks foremost.

Sources of Pollution: Natural pollution due to decaying of organic matter sush as plants and animals; river discharges, volcanic erruptions etc. is not new. But dependent as he is on air, water and food from the environment, man is by far the most active agent in polluting the environment. Large quantities of smoke and dust (Particulates) from industries, industrial and domestic refuses, and automobiles are the main sources of man made pollution in the urban areas. In the rural sector the high degree of utilisation of fertilisers and pesticides for protecting the crops is also causing pollution.

Domestic waste in the form of garbage, litter and rubbish constitutes one of the main sources of pollution. It is estimated that nearly about half a ton of garbage is contributed in a year by a city dwelling individual in the developed countries. For us, here in Calcutta the problem of garbage disposal is only too obvious to be discussed. Some of the measures to minimise pollution from these sources is to burn them in "incinerators", adoption of composting techniques and utilising them as fill material for reclamation of land.

Pollution of our rivers and water sources both surface and underground, constitutes another major problem. This is often due to discharge of sewage and industrial waste material besides, pollution caused locally by human activities. The textile mills, sugar mills tanneries, thermal plants and oil refineries, are the worst contributors and offenders. The pollution of river Ganga due to the outflaws from Barauni Oil Refinery a few years back is still fresh in our mind. Hot water discharges from thermal power stations and cooling water from the industrial units, though beneficial to

some extent, have been found to have adverse effects on fish culture. Large sheets of oil films in the high seas and in the estuarine and shallow coastal waters caused by spillage of oil during transfer through cleaning or unloading the ballast water of tankers, the effect of reducing the oxygen content in the waters, thereby causing concern for the growth of the marine living resourcess. In past two decades it is observed a variety of fish and other aquatic life in the Bombay harbour have shown signs of dwindling.

More obvious than the above two categories, the problem of air pollution is more subtle, spreads over large areas and has reached dangerous levels. Smoke, dust, noxious gases are the main pollutants of air. The automobiles and other transport systems utilising diesel, coal etc. and industries are mainly responsible for this. Fly ash from the thermal plants also contributes in a large measure to this problcm.

The data collected in response to a questionnaire prepared by the Japanese National Committee on air and water pollution problems makes an interesting study. In so far as India is concerned this information could be collected only in respect of thermal power plants. In one single year of 1969, as much as 1,94,904 tons of sulphur dioxide, 36,15,455 tons of fly ash were estmated to have been emitted into the air in the country. To these must be added the pollutants emerging from railways, autombiles and other industries, to get a complete picture.

It is pertinent to note that there is a striking correspondence between the number of respiratory deaths and ailments and the amount of air pollution in Calcutta. The high level of respiratory deaths and air pollutants occurred between October and February each year. Similar observations were made by surveys conducted in and around Kanpur city where the dust fall varied between 18 to 20 tons per sq. mile per month and the sulphur dioxide content from 0.004 to 0.0875 PPM. In certain countries like U.S.A. children are being warned not to undertake deep breathing exercises for fear of inhaling polluted air.

Another important source of pollution is radio active based wastes emanating from the atomic power stations, nuclear plants and fall out from nuclear explosions and tests. Despite the numerous precautions taken to keep this emanation to the lowest minimum possible level, yet minute but measurable quantities of radio active material escape into the environment According to one authority man may be already having radio-active cerium in his muscles, radio-active strontium in his bones and radio-active iodine in his thyroid. Radio-active pollution may result in such hazards as cancer and malformation during pregnancy.

Pollution Control : Everyone wants more and more comfort which means more and more industrialisation and energy consumption in one form or the other which in turn adds to the existing pollution. A solution to this problem lies in controlling and transference of potential pollutants to remote areas and preventing their liberation into the atmosphere. As already mentioned incineration and composting can go a long way in controlling pollution resulting from solid wastes. Anaerobically septic tank treatment, filtration, foam flotation etc. are the more common methods being adopted for the treatment of liquid pollutants. For minimising air pollution different varieties of electro static precepitators are being used. The Aerosol research unit and Desalination and Effluent Engineering Division of the BARC are actively engaged in developing advanced types of equipments and study of pollution control and abatement techniques. Desulphurisation of fuel oil and gases, improved

combustion techniques, and aesthetic planning in locating new power stations and industrial projects, would go a long way in controlling and abatement of pollution.

The need of the hour is to develop cheap and simple techniques which can be easily adopted on a mass scale for abatement of pollution. Enlightened citizenship has got a great role to play in this context. We should take active steps in building up the awareness of the common man to his responsibility towards the community as a whole. All major industrial organisations should set apart 1 to 2 percent of their gross earnings for research and development in this field. Environmental problems are so diverse, since every activity of civilisation interacts with the environment, and therefore call for a National Programme integrated with international efforts. Active support from Government is no doubt a must. It is gratifying to note that we in India, have taken up the challenge of keeping our environment clean not a day sooner. Studies conducted in and around Calcutta between 1955 and 1958 by the All India Institute of Hygiene and Public Health, Calcutta, give the following statistics :

Soot fall	-39.38	-90.98 tons per sq. mile per month
Sulphur dioxide	- 0 021	- 0.058 PPM
Oxides of nitrogen	- 0.043	- 0.122 PPM
Ammonia	- 0.160	- 0.266 PPM
Aldehydes	- 0.04	- 0.12 PPM
Respirable dust	- 0.071	- 0.6 PPM

It shows the maximum pollutants of all cities surveyed so far. So it is most appropriate that it is going to be discussed in details. Finally I would like to extend a cordial welcome to you all.

M. S. Balasundaram