



News Letter

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Dr. R. A. Mashelkar, DGCSIR launches website on fly ash



Dr. R. A. Mashelkar, DGCSIR has launched website on **fly ash** during his visit to Central Building Research Institute on May 19th, 2004. Web site designed and developed by ENVIS Node at CBRI deals with all aspects of flyash generation, utilization and futuristic vision in regard to present scenario in the country. Speaking at the occasion, Dr. R. A. Mashelkar, appreciated the efforts made at Central Building Research Institute in this direction and expressed hope that the information disseminated through website will be very useful in dealing with the problems of fly ash disposal and management with focus on sustainable development of regions of its generation in the country. Shri V.K. Mathur, Director, CBRI elaborated the major contents and salient features of the website and highlighted the work done at CBRI on fly ash utilisation in building sector during the recent past.

This series of news letter is a quarterly publication of ENVIS Node on subject area Fly ash at Central Building Research Institute, Roorkee sponsored by Ministry of Environment and Forests (MoEF), New Delhi. Contributions to the news letter are welcome.

ENVIS Team...

Environmental Studies of Ash Ponds Area of Thermal Power Plants

Large volume of fly ash as obtained from coal based thermal power plants are deposited in specially designed ash ponds within 5-10 km of fly ash generation source. Several of these abandoned ash ponds are now quite close to residential locations and certainly requires serious efforts in marginalizing the environmental impact of fly ash ponding in the coming years.

Exhaustive investigations were undertaken at CBRI to explore the technical feasibility of habitable reclamation of abandoned fly ash ponds at ash pond of NFL captive thermal power plant Panipat and ash pond site of Badarpur Thermal Power Station, Badarpur (Delhi) (Table-1). Samples of ground water from the vicinity of ash ponds at Panipat and Badarpur sites were obtained and analysed for chemical properties and the results are given in Table-2. These results show adequate compability with regard to limits prescribed in IS:10500:1983 for drinking water quality. Monitoring of indoor and outdoor air quality with respect to suspended particulate matter was also undertaken and the results of indoor and outdoor air quality as obtained at both the locations are given in Table 3.

These results show that the fly ash mass available at both the locations is of mildly alkaline nature ($\text{pH} > 7$) with soluble salt content varying in the range of 0.1 to 0.8 percent (Table-1) which could be due inherent association of water solubles in the flyash mass, due to coal quality, combustion conditions etc., besides soil and water mass overlying in the vicinity. The air quality data

obtained at both the locations indicates insignificant impact of fly ash ponding in the vicinity of experimental sites.

By and large, the inherently associated soluble salts with Indian fly ashes broadly fall in the category of gypsum i.e. the sulphates of calcium. The gypsum is a well known sparingly soluble material in water and therefore should not be considered as a major threat to the neighboring environment.

Water quality appraisal was carried out with respect to pH, turbidity, major and minor ionic species etc. and the results are given in Table 2. It is reported that the degree of solubility of toxic heavy metals and other associated oxides largely depend on the pH of the aqueous media. The mobility of metal ions as well as their oxides from solid phase is enhanced under acidic aqueous environment. The acidic environment (even with pH level marginally below 7) is expected under specific rain water leaching. Further, the release of toxic heavy metals from fly ash mass is a complex function of several factors including the composition etc. Further, the soil attenuation capacity largely govern the magnitude of migration of toxic heavy metal to the ground water level. In the present study, soil mass underneath the fly ash pond essentially belongs to alluvial type with high silt content, which generally show moderately low permeability. This is expected to cause substantial reduction in the downward movement of ionic species. However, maintaining the alkalinity level of fly ash mass and providing earth cover of 20-25cm thickness can further reduce environmental impact of fly ash ponding.

Table1: Properties of Fly Ash Samples

Properties	Pani-	Badarpur
H ⁺ conc. (pH)	7.6	7.42
Soluble salts, %	0.133	0.83

Table 2: Water Quality Appraisal

Parameters	Panipat TPS	Badarpur TPS
H ⁺ conc. (pH)	8.0	7.38
Turbidity, NTU	15	2.5
TDS, mg/l	590	640
Chlorides, mg/l	300	62.48
Sulphates, mg/l	180	31.0
Cadmium, mg/l	Tr.	0.023
Arsenic, mg/l	0.27	0.073
Lead, mg/l	0.089	0.0132
Zinc, mg/l	1.89	0.231
Chromium, mg/l	Tr.	0.061

**Table 3: Dust Level Monitoring**

Site	Suspended Particulate µg/ Nm ³
Panipat	300 – 475*
TPS	200 – 350 **
Badarpur	600 – 670*
TPS	300 – 460 **

* Out door Monitoring Location

** In door Monitoring Location

Source: Reclamation of Abandoned Ash Ponds for Human Settlements, Technical Report No. G(S)/0014 Central Building Research Institute, Roorkee submitted to Flyash Mission, New Delhi

Leachability of Elements from Indian Fly Ash

Serial batch leaching has been carried out in Indian fly ash simulating the natural leaching as occurring with rain water system in an ash pond. Most of the elements (As, Ca, Mg, Mn, Na, S and Zn) showed maximum leaching with initial rain water, Cu & Pb showed poor leaching whereas Cd, Co, Cr and Ni did not leach out at all.

Element	Acid (6M, HCl) extractable concentration, ppm	Simulated rain water concentration, ppm
Al	5070.89	0.70 – 5.21
Ca	2684.22	1.41 – 40.39
K	312.29	4.88 – 92.50
Mg	239.30	0.10 – 3.17
Na	51.25	1.00 – 2.25
P	785.73	0.74 – 1.75
Pb	6.64	Mdl (0.01)
S	393.07	0.79 - 42.74
Si	71.05	0.22 - 5.23

As	2.46	0.03 – 0.09
Ba	71.05	0.07 – 0.14
Cu	15.96	mdl - 0.07
Fe	8709.11	0.04 – 1.86
Mn	109.63	0.01 – 0.28
Mo	5.67	0.05 – 0.49
Ti	440.79	0.10 – 0.65
V	16.12	0.11 – 0.17
Zn	10.65	0.03 – 0.10
Co	2.73	-
Cr	14.02	-
Ni	12.75	-
Cd	0.94	-

Mdl: method detection limit

(S. Tripathy et al., Environment International, 27 (2002) 609)

Demonstration of the Process on Fly Ash Bricks at Unchahar (UP)

Process for the manufacture of clay flyash bricks was demonstrated at the brick kiln site of Sh. Manjeet Singh Chawala in Raibarelie (UP) which was attended by over 85 participants largely representing the member of Distt. Brick Kiln Owners Associations Raibarelie.



The programme was conducted in collaboration with Flyash Mission, New Delhi and FG Thermal Power Station, Raibarelie under National Thermal Power Corporation. About two thousand bricks were made with 25

percent addition of flyash at the kiln site during April 6-7, 2004 and equal number of bricks were made using clay mass available at the kiln site as control samples. Bricks were dried in open as per conventional practice. Dried bricks were fired in the fixed chimney Bull's trench kiln at temperature ranging between 980°C to 1020°C with a soaking period of 5 to 7 hours. Fired bricks were evaluated for compressive strength, water absorption properties. The results show that the quality of clay flyash bricks was in conformity with the prescribed values of Bureau of Indian Standard Specification. The participants showed keen interest in the process of making clay fly ash bricks and agreed to adopt the process.

Demonstration of the Process on Fly Ash Bricks at Nawan Shahar and Sangrur (Punjab)

Process for the manufacture of clay flyash bricks at two pre-identified brick kiln locations in Nawan Shahar and Sangrur (Lehra Mohebat) areas.



The programme was conducted in collaboration with Flyash Mission, New Delhi and Punjab Pollution Control Board, Chandigarh. In addition, arrangement for technical presentations and discussions with District level Brick

Kiln Owners at both of respective places were also organised.



Technical presentations / discussions were held on June 15th & 16th 2004 at Nawan Shahar and Sangrur, respectively. About 400 nos. of clay flyash bricks with different proportions of flyash addition were made at these sites.

National Workshop of ENVIS Centres and Nodes

National Workshop of ENVIS Centres and Nodes was organised at Wildlife Institute of India, Dehradun during 25-27th Jun. 2004. The workshop was inaugurated by **Shri Namo Narain Meena, Hon'ble Minister of State for Environment & Forests, Govt. of India.** The Workshop was attended by the following dignitaries:

- Shri Nav Prabhat, Minister of State (Uttranchal) for Forest & Urban Development
- Ms. Meena Gupta, Addl. Secretary, MoEF, New Delhi
- Shri Sudhir Mittal, Joint Secretary, MoEF, New Delhi
- Shri R. P. S. Katwal, DG-ICFRE
- Shri Vinod Rishi, Addl. DG, Wildlife, Dehradun
- Shri S. Singnit. Director, Wild Life Institute of India, Dehradun

More than 70 centres and nodes participated in the workshop. Members of ENVIS node of CBRI, Dr. J.M. Bhatnagar, Dr. L.P.Singh, Mr. Mayank Singhal & Mr. Aditya Chauhan participated in the workshop. Dr. Bhatnagar gave a presentation covering progress of the project and web-site designed and developed by CBRI on subject area **Fly Ash.**

In the concluding session invited lectures were delivered by:

- Shri. V.K. Gupta, Director NIS-CAIR, New Delhi
- Dr. A. Lahri, Advisor, DSIR, MoST, New Delhi
- Dr. A.K. Jain, ARIS, IARI, New Delhi
- Dr.(Ms) Suman Govil- DBT & In-charge, BTIS, New Delhi

It was resolved to further strengthen the Environmental Information System by all the participating nodes and centres.

Forthcoming Events

National Seminar on "Fly Ash Utilisation in particular reference to Pit Head Power Station" will be organised at Anpara Thermal Power Station, Sonebhadra, (U.P.) during July 2004.

For more details please contact:

Shri J. S. Mishra, Hon. Secretary, The Institution of Engineers(India), Anpara Local Centre, 2-Room field hostel, ATPS, Anpara, Sonebhadra-231 225 (U.P.)

Workshop on "Fly Ash Utilisation" at Kolkata and Ranchi will be organised during July/August 2004 by Damodar Valley Corporation, Kolkata.

For more details please contact:

Shri G. K. Ghosh,
Chief Engineer (EM & PC),
Damodar Valley Corporation,
Electricity Department, 10th Floor,
DVC Towers, VIP Road,
Kolkata - 700 054 .

One day Workshop cum training programme for brick kiln owners for use of fly ash in clay bricks will be organised at NTPC, Ramagundam (A.P.) in August 2004.

For more details please contact:

Shri Y. S. Gupta, Sr. Manager (EMG),
National Thermal Power Corporation,
Ramagundam, P.O.-Jyothinagar,
Distt. Karimnagar (A.P.)

Book Reviews

Geotechnical Aspects of Landfill Design and Construction (2002)

Xuede Qian

Geotechnical Engineering Specialist Michigan
Department of Environmental Quality

Robert M. Koerner

Drexel University

Donald H. Gray

Professor of Civil and Environmental Engineering. The University of Michigan

This text addresses landfill design and construction issues in a comprehensive manner. It does this by focusing on all elements of a landfill from design to completion. The text also looks at actual, state-of-the-art construction procedures in a step-by-step manner. This is accomplished with carefully selected design equations and examples, diagrams, tables and homework problems.

Guide to the Deterioration and Failure of Building Materials

R.O. Heckroodt

2003, 184pp., Hard Cover Thomas Telford Ltd., Stock # 3172

Professionals concerned with the build environment are all too often confronted with cases where building materials failed prematurely. Information required for the understanding of the causes of such failures, for identifying the appropriate remedial action, is generally buried under a mass of other information unwieldy reference volumes. Numerous trade bulletins are also available, but they usually only deal with a particular group of materials.

This guide condenses and organizes the relevant information that should allow the professional to take appropriate action, or at least understand the recommendations made by specialists. The distinction between the deterioration and failure of building material and system failure of structures is sometimes rather blurred-this guide is mainly concerned with failure of materials, while system failures are only referred to when the possibility of confusion exists.

Information in the work has been condensed and organized as concise synopses and diagnostic tables, backed by overviews and containing photographs and diagrams to aid the navigation of the reader. Contents include:

- Failure of concrete
- Metal failures and corrosion
- Deterioration of masonry
- Tiling failures
- Deterioration of timber
- Paint failures

New Assignment(s) undertaken at CBRI

TIFAC-DST New Delhi has sponsored a project entitled **Ganulometric and mineralogical evaluation of fly ash for brick making and allied civil works in northern region**. The study involves exhaustive laboratory and field investigations on fly ashes of different mechanical and mineralogical compositions with a view to optimize the mix compositions for the production of clay fly ash bricks. The study shall be pursued under the technical leadership of Dr. J.M. Bhatnagar with financial support from TIFAC-DST.

Contact for more Information

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