



CFRI NEWSLETTER



Vol. 2

No.3

Quarterly Issue

July-Sept. 2002

Established in November 1946: CFRI is unique Institute of its kind in India under CSIR to conduct research in different areas of Fuel Science and Technology with emphasis on coal and lignite

Mission: Enhance the position of the Institute as a premier R&D centre for technology development and transfer by forging strategic alliance with other agencies and continuously strive for excellence in the area of potential expertise for generation of basic knowledge, innovation, and advanced concepts in science and technology for economic, efficient, and environmentally safe energy management

HIGHLIGHTS OF THE COMPLETED PROJECT

Comparative Durability Study of Fly Ash Bricks

(Sponsored by Fly Ash Mission, TIFAC, Dept. of Science & Technology, Govt. of India, New Delhi,)

Utilization of fly ash for civil construction and building material purposes is considered to be one of the important areas of bulk applications of fly ash. Fly ash based bricks being new to the market, there is apprehension about their durability, which necessitates demonstrations to be made on their durability in different environmental conditions. At CFRI, a project was undertaken to study and compare the durability of fly ash bricks with that of conventional red clay bricks. In this study, various environments viz. alkaline, saline, acidic (CO₂, NO₂, SO₂, chloride), UV radiation, wetting and drying, temperature and humidity with enhanced level of severity were created. Two types of fly ash bricks along with red clay bricks were treated in these aggressive environment chambers. The level of severity was maintained throughout the treatments and bricks were withdrawn at regular interval of 100, 300 and 500 days of treatments followed by their testing and evaluation in respect of surface appearance, bulk density, compressive strength, moisture content, loss on ignition, water absorption, efflorescence, wear resistance and fire treatment. It was observed that there was no major change in the durability characteristics of treated bricks with that of untreated bricks and in most of the cases the fly ash bricks were quite comparable with red clay bricks.

Bulk Utilization of Fly Ash from Ramagundam Super Thermal Power Station in Agriculture and for Reclamation of Waste/Degraded Land

(Sponsored by Ramagundam Super Thermal Power Station, NTPC)

From the field trial studies made, it was observed that fly ash/pond ash helps in improving the physico-chemical properties of the soil such as water holding capacity, porosity, mechanical composition, bulk density, available water and nutrient retention capacity and bacterial activities of soil. The various crops such as maize and ground nut grown in fly ash/pond ash amended plots have shown better germination / growth rate, early maturity and significant increase in the yield of such crops with

enhancement in nutrient contents and significant residual effects on the yield of succeeding crops. No harmful effects due to carry-over of toxic trace/heavy metals in soil system, crop produce and ground/surface water after application of fly ash/pond ash have been observed. The ash filled low-lying area reclaimed through biological means for agro-forestry purpose has shown significant improvement in the fertility status and biological activities. The field trials in farmers' field and other extension activities conducted in different villages in the locality have created sufficient awareness amongst the local farmers about the beneficial effects of fly ash/pond ash in agro-forestry sectors.

QUANTIFICATION OF H₂ AVAILABLE IN COAL FOR PRODUCTION OF FLAME DURING COMBUSTION (Sponsored by SSRC, Dept. of Coal, Min. of Energy, Govt. of India, New Delhi)

During the combustion of coal, a part of it produces flame and other sustains burning. Among the flame producing moieties, hydrogen is the key element. CFRI has developed a simple and unique methodology using C & H analysis and extra pure N to assess quantitatively the amount of hydrogen available in coal for flame production. It is an estimate of hydrogen, which comes out first during thermal shock of coal at 800°C. This estimation would help in assessing a coal in terms of its combustion characteristics. It is expected that thermal power stations may adopt the methodology to assess the characteristics of coal they will use in future.

US PATENT GRANTED TO CFRI

The invention, "Process for the Production of Fly Ash Slurry" has bagged US Patent, bearing the number US 6419620, date of grant being 16th July 2002.

Abstract: The present invention describes an improved method for forming fly ash slurry by mixing fly ash and water with an additive containing 0.5-2 wt % ammonium salt of humic acid and 0.03 to 0.05 wt % tannin extract. The product slurry does not require large amount of water for transport to storage space due to its enhanced viscosity and stability.

PATENT INFORMATION: COAL AND ITS UTILIZATION

- ❑ US 6,422,392, July 23, 2002
Title: Ammonia Removal from Fly Ash in an Acoustically Enhanced Fluidized Bed.
Inventors: Levy; Edward Kenneth (1030 Raymond Ave., Bethlehem, PA 18018)
Abstract: This invention describes a process for removing ammonia from fly ash during processing on an inclined fluidized bed.
- ❑ US 6,422,494, July 23, 2002
Title: Methods of Controlling the Density and Thermal Properties of Bulk Materials.
Inventors: Reeves, Robert A. (Arvada, CO); Kenney; Charlie W. (Littleton, CO); Berggren, Mark H. (Golden, CO)
Abstract: This invention describes about efficient, low cost transportation and storage of bulk materials (including coal) from mines and/or factories to markets.
- ❑ US 6,436,158, August 20, 2002
Title: Coal Reforming Process and Apparatus Therefor.
Inventors: Fujikawa, Keiji (Hiroshima, JP); Omoto, Setsuo (Hiroshima, JP); Yamaguchi, Hisao (Hiroshima, JP)
Abstract: As one of the coal reforming treatment steps constituting a coal reforming process, an oxidation treatment step is carried out on a circular grate. For this purpose, there is used a coal reforming apparatus comprising a circular grate, the circular grate being separated into a plurality of zones which include fixed bed zones and mixing zones for fluidizing the coal properly between adjacent fixed bed zones.
- ❑ US 6,447,437, September 10, 2002
Title: Method for Reducing CO₂, CO, NO_x, and SO_x Emissions.
Inventors: Lee; James Weifu (Oak Ridge, TN); Li, Rongfu (Zhejiang, CH).

Abstract: This invention speaks about converting CO₂, CO, NO_x and SO_x emissions into fertilizers including the step of collecting these materials from the emissions of industrial combustion facilities such as fossil fuel-powered energy sources and transporting the emissions to a reactor.

Source-www.uspto.gov

LECTURE

Dr (Mrs.) Indrani Chandrasekharan, Director, Ministry of Environment & Forest, Govt of India, New Delhi delivered a lecture on the subject "Environmental Projects of Interests to CSIR Institutes" on 28th July 2002".

TECHNICAL PRESENTATION

Mr. Johan Hawkins, Vice President, Leco Corporation, USA made a technical presentation on coal analyzer (LECO MAKE) to boost up its usage by Indian scientific community on 19 September 02.

PAPER PRESENTED IN SEMINAR

A paper entitled "Role of CFRI's Fly Ash Amendment Technology (FASAT) in improving the Socio-ecological Condition of Farmers via Improvement in Soil Fertility and Crop Productivity" was presented by Dr. N. K. Srivasatava in the 22nd Annual Session of the Academy of Environmental Biology, held from 11 to 13 September, 2002 at National Bureau of Fish Genetic Resource, Lucknow.

RELEASE OF ANNUAL REPORT

His Excellency Justice Shri M. Rama Jois, The Governor of Jharkhand State released the CFRI Annual Report 2001-02 on 20th Sept. 2002. This report covers the overall activities of the Institute during the last financial year. After the release, copies of annual report were presented to the VIPs.



His Excellency Justice M. Rama Jois, Governor of Jharkhand releasing CFRI Annual Report 2001-02 on the occasion Diamond Jubilee Year of CSIR Foundation Day Celebration on 26th Sept. 2002. Also seen (L-R) Sri R.N Sharma, Former Chairman, CIL and Dr Kalyan Sen, Director, CFRI

TECHNOLOGY TRANSFERRED

Technology for Soft Coke Plant was transferred to M/s. Bhagwati Fuel, Gaya on 22.08.02.

TESTING AND EVALUATION

462 numbers of different types of samples such as coal, coke/jhama, coal tar, ash, transformer oil, etc. were analyzed and the results were supplied to various concerned parties viz. ECL, BCCL, NTPC, SAIL, State Electricity Boards, DVC, Coal Controllers Organization, CMRI, TISCO, and some private organizations.

PARTICLE SIZE ANALYSIS

Particle size distribution analysis was made for 21 samples of fly ash and catalysts of different parties and reports were submitted to the concerned parties.

KISAN GOSTHI ORGANIZED

For popularization of bulk use of fly ash in agriculture and wasteland management, a Kisan Gosthi was organized by CFRI at Pipri village, the experimental site for field demonstration, on 3rd September 2002, wherein the officials of Obra TPP, Block Development Office, District Agriculture Department were present along with a good gathering of local farmers (more than 50) and Gram Pradhans from different neighboring villages. Dr N. K. Srivastava Scientist explained about the beneficial effects of pond ash application in agriculture and for reclamation of waste/degraded land and pointed to better performance of present Kharif crop grown in pond ash amended fields. During discussion, the farmers themselves admitted the beneficial effects of pond ash in improving the texture of soil and crop yield (up to 35 percent). Farmers also stressed on their demand for more supply of pond ash to their fields. Consequently authorities of Obra TPP ensured to supply the same to the farmers.

INDEPENDENCE DAY

56th Independence Day was celebrated at CFRI with full of enthusiasm and in colorful manner. Dr Kalyan Sen, Director CFRI hoisted the tricolor flag in front of main building and addressed the gathering of staff and their family members and children and highlighted the salient achievements of the institute during the previous year.

HINDI PAKHWARA

Dr. (Mrs) Premlata Dwivedi, a wellknown poetess inaugurated the Hindi Pakhwara celebration on 2nd Sept. 2002. This was followed by a Kavi Gosthi, which was conducted by Shri Brijendra Kumar, Artist, All India Radio, Ranchi.

Hindi Pakhwara was organized from 2 to 16 September 2002 in which different events, such as Scientific Essay Competition, Administrative Noting & Drafting Competition, and Evaluation of work done in Hindi took place. Besides, elocution competition for the wards of CFRI employees was conducted for the first time in the programme. The function was concluded on 16th September 2002 in the presence of Chief Guest, Shri V. K. Shukla, Director, Akash Vani Ranchi and Dr I. A. Khan, Principal, P.K. Roy Memorial College, Dhanbad, was Guest of Honour. In the concluding function, the Chief Guest gave out token prize and a certificate to all the participants of the competition.

CSIR FOUNDATION DAY

His Excellency, Justice Shri. M. Rama Jois, The Governor of Jharkhand, delivered CSIR foundation day lecture on its Diamond Jubilee year on 26th Sept. 2002. He spoke on the " Role of CFRI in Energy Sector". On this occasion, The Guest of Honour Shri R. N. Sharma, former Chairman, CIL, Calcutta in his brief address indicated for the vast potentialities of Jharkhand to step up coal production.

Shri P. K. Bandyopadhyay, Dy. Director, gave out the mementos, samman patras and wristwatches to the retirees and to those who completed their 25 years of continuous service in CSIR.

NEW ARRIVALS IN LIBRARY

- ❑ S. N. Bose: The Man and His Work-Part-I; Collected Scientific Papers; Part-II: Life, Lecture and Addresses, Miscellaneous Pieces, S. N. Bose National Centre for Basic Science, Calcutta, 1994
- ❑ The Report of High Power Committee on Disaster Management by NCDM, Dept. of Agriculture, Min. of Agriculture, Govt of India, New Delhi, 2001.
- ❑ 2001 International Ash Utilization Symposium: CD-ROM, UK Centre for Applied Energy Research and U.S. Department of Energy, 2001.
- ❑ Market Survey-cum-Detailed Techno-economic Feasibility and Report on Lime-Bonded Fly Ash Bricks, National Institute of Industrial Research, New Delhi, 2002.

CFRI IN MEDIA

- ❑ CFRI adds another feather to its cap by successful commissioning of briquette plant based on its know how at Veraval, Gujarat (*Prabhat Khabar*, 09.08.02; *Hindustan*, and *Hindustan Times*, 11.08.02).
- ❑ Need of processed coal rising (*Hindustan Times*, 16.08.02).
- ❑ Pivotal Role of Scientists in National Development: Sen (*Awaz*, 17.08.02).
- ❑ CFRI instrumental in productive use of power stations' fly ash (*Hindustan Times*, 27.08.02).
- ❑ Chief Minister, Shri Babulal Marandi and Science and Technology Minister Shri Samresh Singh expressed their happiness over the growth performance of medicinal plant while on a visit to the planted field at Chandankiyari, Bokaro (*Prabhat Khabar*, 27.08.02 and 28.08.02; *Bihar Observer* 28.08.02).

- ❑ Chief Minister happy over the medicinal plant projects and nurseries (*Hindustan Times* 28.08.02; *Hindustan* 29.08.02).
- ❑ Medicinal plant flourishing on barren land (*Dainik Jagaran* 28.08.02.)
- ❑ Hindi Pakhwara organized in CFRI (*Hindustan and Prabhat Khabar*, 4.09.02; *Hindustan Times and Aaj*, 5.09.02; *Hindustan*, 19.09.02).
- ❑ CSIR Foundation Day celebration at CFRI on 26th September, 2002 (*Hindustan Times, Prabhat Khabar, Awaj, Aaj, Bihar Observer, Hindustan* 27.09.02).

WORLD AROUND

Particles from Space Speak where about of Oil

A New career as oil prospectors beckons from atomic physicists. The tiny particles called solar neutrinos that stream out from the Sun's core might be used to prospect for oil in the earth's crust, though putting the idea into practice is still a problem. Neutrinos are very light particles produced by nuclear reactions in stars. Electrons, muon and tau neutrinos-flip from one type to another as they come out from stars at nearly the speed of light. Neutrinos from the sun are constantly whizzing right through Earth, and detectors can pick the number that interacts with atoms inside Earth. Researchers in Italy say that these neutrinos could reveal the location of oil reserves, according to a report in *New Scientist* (*The Hindu*, 25 July, 2002.)

Growth Rate of six Infrastructure Industries Goes Up

Growth rate of six infrastructure industry such as crude petroleum, petroleum refinery products, coal, electricity, cement and finished steel shot up to 6.7 per cent in the first quarter ended June 30, 2002 as against 1.2 per cent growth in the same period a year ago, thereby giving firm indications of revival of industry. Beginning the year with 5 per cent growth in April, the six infrastructure industries improved to 5.3 per cent in May and to 5.9 per cent in June. The six sectors had logged to mere 0.8 per cent growth in June, 2002, according to the latest official data released (*Hindustan Times*, July 23, 2002).

Coal Bed Methane Extraction and Utilization

Coal-bed methane (CBM), a naturally occurring gas in coal seams, consists predominantly of methane apart from lower concentration of higher hydrocarbons and non-combustible gases. The mining of most of the world's CBM resource available in the seams is a big challenge. Although considerable efforts have been made in this regard, no major commercial schemes have yet been developed out side USA and Australia, the reasons being lack of markets, gas transport infrastructure and low coal seam permeability.

Coal mine methane (CMM) captured in operational mines for safety reasons has been exploited with varying

degrees of successes, where use of the gas included space heating, industrial processes and power generation. Of late, 80% of UK coalmines put their faith in methane drainage to capture gas before it enters the mine ventilation system, thereby enabling gassy coal seams to safely workable. Mine gas schemes benefit the environment by mitigating GHG emissions from a major source as well as supplying clean energy from a waste product. In the USA, 90% of the drained gas is gainfully used and the attention of the USEPA is now relying on the development of commercial methods for removing low concentrations of methane from exhausted ventilation air. About 40% of the gas drained in UK mines is used and this could enhance to 70% if proposed new schemes are introduced.

The exploitation of gas from abandoned mines is an important CBM development programme. Reserves of this gas appear to exceed substantially recoverable mine gas and VCBN in the UK. Six abandoned mine gas schemes are operational in the UK and more are planned. There is strong commercial interest in this field in the UK, France, Germany and the USA. Besides, UK has initiated transfer of this technology to China. Abandoned mine gas utilization schemes benefit the community by providing clean energy from a waste product and reducing surface emission hazards associated with old workings apart from contributing to a reduction in GHG emissions. Researches in the USA & China and microbiological study indicate that commercial CBM prospectus may be found in a greater range of geological environments than previously thought.

Surface to in-seam drilling technologies recently developed for CBM applications may facilitate commercial gas production from lower permeability seams than have previously been exploited. Recent development of technologies in the USA for using CMM and AMM include micro-turbines and fuel cells. These can be used to meet on-site power requirements. Further R&D and technology transfer activities to enhance the commercial potential of CBM technologies originating or applied in the UK are identified followed by consultations with regulators, researchers, government organizations, CBM operator, service providers and equipment suppliers in the UK and overseas.

The use of VCBM, CMM and AMM is expected to offer various commercial and environment benefits including competitive price, accessibility in most coalfield areas, clean fuel with low emission, wide range of established uses (e.g. heat, power generation, chemical feedstock), reduced GHG emissions and useful energy from a waste product of mining (CMM and AMM).

Source: www.dti.gov.uk/ct/

EVENTS AHEAD

- ❑ Vigilance Day on 31 October, 2002.
- ❑ Jharkhand Establishment Day 15 November, 2002.
- ❑ Research Council Meeting on 25 November, 2002.

CONTACT ADDRESS

Central Fuel Research Institute, P. O.: F. R. I., Dhanbad –
828 108, Jharkhand, India.

Telephone-EPABX: (0326)-2381001 to 2381010,
2381152, 2381174, 2381195 and 2381200.

FAX: (0326)-2381113, 2381385 and 2381560.

Email: dnb_dcfri@sancharnet.in

Website: <http://www.cfrindia.com>

Compiled & Edited by Dr L.C.Ram, Shri P. C. Kumar and Dr Rajesh Kumar; Secretarial Assistance by Shri R. N. Sharma; Published by Director, CFRI, Dhanbad.