



Ash Development Association of Australia

COAL ASH matters

11
APRIL

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CCPs - a valuable resource

www.adaa.asn.au

Editorial:

Alison Fitzgerald

Evidently, the issue of climate change and global warming is a serious matter in-light of the Federal governments recent decision to impose a carbon tax on the Australian economy. Whilst the Ash Development Association of Australia (ADAA) has been a keen fringe observer of the climate science debate, our industry members use of a recovered resource like Coal Combustion Products (CCPs) result in carbon emissions saved. Fueling this debate, the current plague of natural disasters has been used to good effect by political and environmental groups, and to the casual observer, there would appear to be no better time to make the required changes in the interest of benefiting the environment.

This issue of Coal Ash Matters (CAM) focuses on current projects that are using innovative, eco-friendly

concrete solutions, a brief history of the ADAA, an overview of the current stages of the CCPs handbook and an insight into some of the associations new and revamped companies.

This edition also features an exciting reminder that the next World of Coal Ash (WOCA) conference is coming up in Colorado on 9th- 12th May.

For more information on the ADAA, its members and the industry, or to download an electronic copy of this newsletter, please visit our website: www.adaa.asn.au

Boral Cement Limited - New name, same service

Warren South

As of 1 August 2010, the Blue Circle Southern Cement (BCSC) business will be known as Boral Cement Limited.

The BCSC brand will be retained as a product brand in Boral Cement's packaged range of products together with the Boral logo. Bulk products will trade under the Boral Cement name.

The intention is to identify the cement business more clearly with the Boral group. BCSC has a proud history and has contributed strongly to Boral's success and to local communities over many years particularly in its role as a major local employer.

Jim Young, the National Sales Manager for Boral Cement said "The transition from BCSC to Boral Cement was done in a cost effective way that has been staged rebranding activities over several months.

"Boral is one of the most recognised brands in Australia and is an increasingly recognised global

brand. It's a strong brand that stands for market leadership; value for customers; and for delivering contemporary, innovative and environmentally responsible product solutions to the building and construction industries. These brand attributes are aligned with our Australian cement business and therefore it makes a lot of sense for us to proudly call ourselves Boral Cement."

As part of the rebranding, the supply and technical support for FA will now be handled through Boral Cement. Previously, Boral Ash was the responsible entity within Boral, however, it is now joining as one of the suite of products which can be obtained from Boral Cement.

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Berrima Works



Berrima Works at Night



Coal Ash Matters is published by ADAA

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Membership

COMPANY MEMBERS

A primary role of the ADAA is to bring together producers and marketers of coal combustion products (CCPs). Our activities cover research and development into CCP usage, advocacy and technical assistance to CCP producers and users, as well as a forum for the exchange and publication of CCP information.

For more information on the Association, visit us at www.adaa.asn.au

- Adelaide Brighton Limited
- Alinta Energy Group Ltd
- Boral Cement Limited
- Calera Corporation
- Cement Australia Pty Ltd
- Conneq Industrial Infrastructure Pty Ltd
- CS Energy Ltd
- D2G Joint Venture
- Delta Electricity
- Eraring Energy
- Flyash Australia Pty Ltd
- Golden Bay Cement (New Zealand)
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- LoyYang Power
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- TRUenergy
- Vecor Australia
- Verve Energy
- Weston Matrix

RELATED ASSOCIATIONS

UK Quality Ash Association

www.ukqaa.org.au

American Coal Ash Association

www.acaa-usa.org

CSIRO

www.cmit.csiro.au

Association of Canadian Industries Recycling

Coal Ash

www.circainfo.ca

Birth of the Ash Development Association of Australia (ADAA)

Ron McLaren

The ADAA was formed in 1991, at a time when there was only one crossing of Sydney Harbour between the city and North Sydney. The second crossing, the soon to be built Sydney Harbour Tunnel (SHT), was a catalyst for the formation of the ADAA.

In the late 1980's, Transfield proposed to design and construct the SHT using submerged concrete tube elements. This form of construction, casting massive concrete structures in a dry dock then floating them into place in Sydney Harbour, had many challenges and received wide media coverage. The design life of the concrete was 100 years. Transfield's consultants had just successfully designed a similar tunnel in Hong Kong with a mixture of general purpose cement (GP) and fly ash (FA) used for the binder. The consultants initially proposed similar binders for the Sydney tunnel.

When the general blend (GB) was specified using a cement and ground granulated blast furnace slag binder it became apparent that there needed to be a stronger technical and education push for FA. While the durability benefits of FA concretes at the time were well known, they were less well documented than those of the slag industry.

At that time a Boral subsidiary business, Boral Pozzolan, held shared ownership with Rocla of Flyash Australia (FAA). FAA was the only FA supplier operating in NSW. Blue Circle Southern Cement (BCSC) was also owned by Boral and actively promoted slag cement based products. There was a robust rivalry between all binder producers; cement, slag and the FA.

BCSC had spent considerable time and resources developing Marine Cement, which was a combination of 35% cement and 65% slag. They were anxious to find a prestigious project to promote the product and the SHT was the obvious choice. A key reason why Marine Cement was used in the SHT was the data in the vast BCSC test program, which proved the durability properties of slag cements to achieve the 100-year design life requirements.

During this period the coal fired power stations had become much more aware and active in increasing ash utilisation. Both the Electricity Trust of SA (ETSA) and the Electricity Commission of NSW (ECNSW) were independently funding significant research and demonstration projects to increase the use of FA in concrete. The news that the SHT was no longer going to use fly ash concrete caused consternation to the FA producers and marketers alike.

ETSA's Roley Miller at the Northern power station at Port Augusta had a very "hands on" Research and Development (R&D) program. With the assistance of Barry Butler and Bill Tanner of Rocla, they produced FA concrete blocks on site. The station even had a full overhead batch plant allowing it to produce FA roads around the power station. Similarly the ECNSW was

very active with Peter Nelson ensuring FA concrete was specified in all its major construction works. The ECNSW funded a number of investigations by CSIRO to support these activities.

With this background some form of collaboration between the ash marketers and the power stations to promote FA usage and share the costs of R&D seemed sensible. Following informal discussions with the relevant parties, Boral Pozzolan suggested a formal meeting to consider setting up what was to become the ADAA.

There had been an earlier association for fly ash marketers, the National Ash Association (NAA) in the early 1980's. The NAA was comprised of only marketers, as coal fired power stations were not invited to join. The only reason for the formation of the NAA was to have a voice on Standards Committees for the publication of an Australian Standard for FA. Following the publication of the Standard, the NAA dissolved.

The initial meeting of the ADAA included representatives from NSW, QLD, SA, and WA covering the power producers and the marketers. Ultimately it was the ECNSW, ETSA, the State Energy Commission of WA, Boral, Rocla and Adelaide Brighton Cement who agreed to form an Association. Generators in Victoria and Queensland along with regional marketers did not join at this time.

Ron McLaren chaired the first meeting and one of the first tasks was a name for the association. Peter Heeley suggested the current name and while it seemed a little cumbersome nobody suggested anything better so the ADAA was born. In the early years the ADAA received significant support (in-kind and fiscal) from the ECNSW and later Pacific Power. In particular, Peter Nelson administered tasks from the Sydney office.

A launch was held in Adelaide with an appropriate political presence, and a notable talk from Alec Samarin telling us that power stations were FA factories that made electricity as a by-product. The next task was to sort out a funding formula based on the volumes of fly ash sold into various end uses. Membership fees were set at a sufficient level to allow us to engage the CSIRO for a comprehensive test program into the durability aspects of FA concrete.

This built on extensive CSIRO studies done for ECNSW and covered the areas where information was lacking on the SHT project, in particular chloride diffusion and resistance to sulphate attack in a marine environment. Together with the collation and production of extensive technical documentation and literature, we were able to restore

The Use of Pond Ash in the Filling of Abandoned Coal Mines Under the Ipswich Motorway

Bill Holz

The Queensland Department of Transport and Main Roads (DTMR) committed to upgrading the Ipswich Motorway between Dinmore and Goodna (D2G). During the preliminary site investigation and through the early stages of design, abandoned coal mines were discovered under sections of the footprint of the new motorway. Whilst there was knowledge of the existence of these mines that had been operational from the early 19th Century through until 1987, details as to size, depth and accurate location were largely unknown.

The DTMR, given the complexity of the projects requirements, formed the Origin Alliance to construct the motorway and to find solutions to mitigating the subsidence effects of the old coal mines workings. Origin Alliance formed a Sub Alliance (Origin Keller Sub Alliance or OKSA) with Keller Mine Fill, a specialist mine fill contractor, to tackle the task of accurately locating and target filling these mines so as to provide protection to the motorway asset against a future subsidence event.

The Mine Filling Team adopted the use of a mix of pond ash, from CS Energy's nearby Swanbank Power Station, in combination with GP cement, crusher dust and water to form a paste to fill the mine voids. The Swanbank pond ash, a readily available source of approximately 7 million cubic metres of ash, provided a supply of pond ash filler to make the paste mix more economical. It is critical that waste pond ash cost remain nominal or the cost of filling of abandoned mines will become so prohibitive as to be non viable, eliminating a substantial reuse activity.

The pond ash was mined and screened at the Swanbank Ponds. Screening became necessary due to the presence of rocks from earlier road building activity discovered in some sections of the ponds. It is important that these obstructions be removed because of the substantial damage they cause to the paddles in the mix chamber of the paste mix plant. It was also important to limit the moisture content of the fly ash to keep the material density low and minimise transport costs. Also, it was important to reduce the potential for blockages in the hopper bins at the paste mixing plant. To this end the use of a drained stockpile of pond ash material is preferred.

Remediation of abandoned mines required approvals from the Queensland Department of Environment and Resource Management (DERM), the activity being classed as an Environmentally Relevant Activity (ERA). The mine remediation task included the injection of paste material into flooded mines due to the sensitive environmental issues associated with altering the level of the water table. Water was then pumped from the mines to a water treatment facility during paste injection at a rate to match the paste injection volume. In this way the ERA involved not only handling issues related to the use of the pond ash, but also the control of water levels to maintain them at the natural level. The mine water also had to be treated with a Reverse Osmosis water treatment facility, since the mine water is considered to be a regulated waste.

The approvals involved strict limitations on pond ash transport and storage, especially in relation to dust and runoff management from pond ash stockpiles. The pond ash stockpile was maintained at the purpose built paste mix plant, located adjacent to the mines at the proposed new motorway. The stockpile was covered to protect against the weather and to limit the potential for dust generation by incorporating a sprinkler system into the roof. In practice, the roof and bin enclosure combined with the mined moisture content of the pond ash, mostly eliminated dust generation, requiring only limited need to apply sprinklers.

Because pond ash is classed as a regulated waste, strict conditions were placed on the paste mix design with design changes beyond a 10% variation by weight to any constituent requiring DERM approval.

Mine fill operations continued from mid July 2009 through to November 2010, during which time approximately 50 000m³ of fly ash was consumed.

The motorway is now being constructed safe in the knowledge that mine subsidence risks have been eliminated.

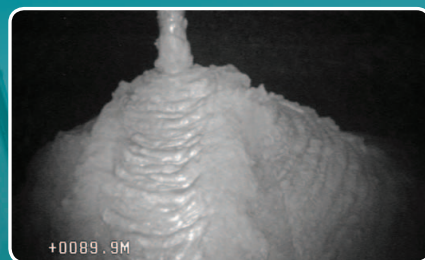
Bill Holz, Mine Fill Manager, Keller Mine Fill



Pond ash covered stockpile at the paste mix plant



Infill paste flowing down old roadway – photo from remote borehole video camera



Higher viscosity paste used to create barrier walls at 89.9m below ground level

Coal Combustion Products Handbook

Colin Ward

The CCPs 'Handbook' was first published in 2007 by the Co-operative Research Centre for Coal in Sustainable Development (CCSD) with contributions from the ADAA. The Handbook has become widely acknowledged as an important and useful reference source on published scientific literature and technological developments over the past 30 years. Interest in this publication has extended beyond Australia. Since publication in 2007, more than 450 copies have been distributed throughout Australia and overseas.

The ADAA, now custodian of the handbook following the closure of CCSD, has begun the process of developing a second edition consistent with agreements with industry participants. Work on this new edition which commenced in 2010, is scheduled for completion in late 2011.

Beyond updating the original chapters to incorporate more recent developments, the second edition will address CCPs derived from other coals, such as sub-bituminous and brown coals used in South Australia and Victoria respectively. The objective being to widen the scope of the handbooks relevance.

The over-arching goals for the handbook remain, that is; to disseminate current knowledge, identify sources of relevant information, provide

guidance to both technical and non-technical readers, and summarise new R&D that can lead to more productive and economic use of CCPs.

A total of fourteen (14) chapters are planned (extending from the original twelve (12)), on topics that include methods for characterisation, regulatory changes, environmental considerations and the technological developments of CCP utilisation in a variety of different fields.



For further information contact Craig Heidrich – cheidrich@adaa.asn.au

New Member Profile- Conneq Infrastructure Services (Australia) Pty Ltd

Dr Jane Aiken

A new member to the ADAA, Conneq, is a specialist engineering, construction and asset management contractor, connecting industries and communities with vital infrastructure. Comprising of business units with operating histories of 60 years or more and employing in excess of 3500 people, the company is a leading service provider to the energy, utilities, resources, industrial, transport and social infrastructure sectors.

Conneq is contracted to provide services to seven (7) coal-fired power stations in NSW and QLD. This portfolio includes the operation and maintenance of fabric filter and precipitator ash and dust systems, and the transport and placement of ash to repositories for the power stations at Wallerawang and Mt Piper, near Lithgow, West of Sydney.

Ash management for Mt Piper Power Station had its beginnings with Mt Piper Ash, then MPA Energy Services. The business was further developed as a part of Clough Engineering and Maintenance Pty Ltd, which was acquired by Conneq during 2008 (formerly known as Bilfinger Berger Services). Conneq's regional project manager, Brett Lowry, has an eighteen (18) year association with Mt Piper and Wallerawang, providing a significant level of corporate knowledge related to the operation of ash and dust at the sites.

With the reduction of ash to repository storage, (an important objective for governments and corporates) finding a beneficial use of coal ash is now a priority. Conneq believes it is well placed to develop systems and incorporate the utilisation streams necessary to assist this objective.

Leading Conneq's beneficial use program is Dr Jane Aiken, environmental scientist at the Mt Piper site. Jane has a PhD qualification in environmental studies from the University of Western Sydney (UWS).

Jane is also an accredited stage 2 soil scientist with the Australian Society of Soil Science Incorporated (ASSSI) and has a particular interest in facilitating the supply of ash products to consumers within the agricultural and construction sectors. "Currently our ash volumes to storage are 105,000 tonnes per month," Dr Aiken said.

"Given the government approved utilisation target of 40%, in three (3) years at least 25,000 tonnes of the CCP material per month needs to be supplied in order to establish and sustain a new market and demand. We believe we can achieve this target by working with our colleague members of the ADAA".

For further information please contact Project Manager Brett Lowry (brett.lowry@conneq.com.au) or Dr Jane Aiken (jane.aiken@conneq.com.au), or call +61 2 6355 7217.



Dr Jane Aiken

Green Buildings- How the proposed Green Building Council of Australia (GBCA) Concrete system will work

Tom Benn

Introduction

In late 2009 the GBCA initiated a review of the credit points available for concrete in the Green Star rating system. An expert panel was appointed drawing members from across the concrete industry including cementitious material suppliers, concrete producers, design engineers, academics and alternate concrete technology suppliers. The committee debated and discussed proposals with colleagues and interested bodies to produce the proposal currently out for public review.

Proposal in Brief

During the lengthy period of review a consensus was reached that three points for concrete was about right in respect of the 75 to 100 required for a 6-Star rating. A comparison between the current and proposed criteria has been tabulated in the two tables below.

Two points are available if the Portland cement component of all the concrete in the project is substituted by supplementary cementitious materials, as follows.	
Current	Proposed
1-Point	
30% reduction for in-situ concrete 10% reduction for pre-cast concrete 15% reduction for stressed concrete	30% reduction compared to the reference concrete
2-Points	
60% reduction for in-situ concrete 40% reduction for pre-cast concrete 30% reduction for stressed concrete	40% reduction compared to the reference concrete

Notes to Table 1:

The reference concrete is tabulated in the "Concrete Credit" proposal and it is suggested that engineering judgment will be required for special grade concretes as to the closest performing mix.
Portland cement is defined as per AS 3972-2011 as Ground Portland Cement Clinker and Calcium Sulphate.

Current	Proposed
Where at least one of the requirements of Table 1 has been satisfied	Where one of the two criteria is met
20% of all aggregates in the structural concrete is recycled or is slag aggregate	All cement is sourced from manufacturers using at least 4% alternate fuels, across the company, to manufacture clinker
CNo natural aggregates are used in the non- structural concrete	40% of the coarse aggregate is slag aggregate or alternate materials or
	25% of the fine aggregate is manufactured sand or alternate materials

Notes to Table 2

The use of alternate fuels shall be independently verified
The use of alternate fine and coarse aggregate shall not increase the Portland Cement content by more than 5 Kg/m3

Conclusions

The proposal goes a long way to attempt to achieve a practical methodology that will result in achievable targets throughout the country. It is also important that the proposal be read in conjunction with the following information available on the GBCA website (www.gbca.org.au):

Background and Outcomes – Green Star Concrete Credit Review
Concrete Credit
Revised credit will drive demand for environmentally responsible concrete, media release 1 Dec 2010
Draft Revised Concrete Credit Released for Public Comment, 1 Dec 2010





The World of Coal Ash

May 9-12, 2011

Denver, Colorado

Tech Center

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Vecor Limited

Jared Clissold

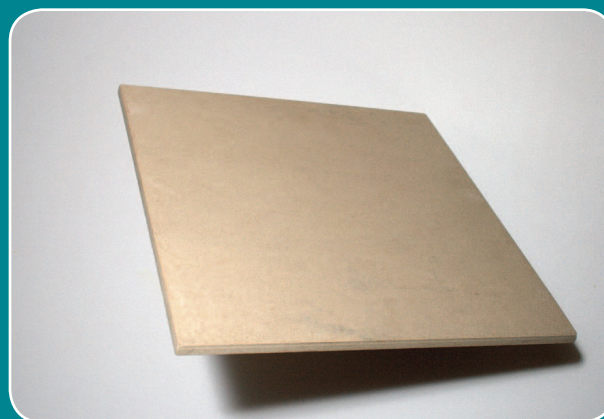


Australian born Vecor Ltd holds an exclusive University of NSW (UNSW) patent for sintering FA into useful articles.

In October of 2010, Vecor completed a successful third-party audit of their processes for manufacturing high-grade ceramic building products from 80% FA. Vecor's initial manufacturing facility will produce ceramic floor and wall tiles; it is expected to be in production by quarter 4, 2011. The company uses mostly coarse, waste-grade FA or material stockpiled in landfill sites.

Vecor's vision is to provide power stations with a comprehensive utilisation solution. The company has successfully prototyped bricks, blocks, sands, aggregates and a range of other high-performance building materials. Vecor plans to build a production capacity adjacent to power stations, addressing local market demand with a range of high-quality 'green' building products at competitive prices.

Global engineering firm Ove Arup performed a complete review of Vecor's processes and equipment, visiting Vecor facilities twice and monitoring the complete manufacturing process. In a comprehensive report, Arup determined that Vecor's processes provide for substantial cost and environmental advantages over existing manufacturing methods, saving 80% water usage, reducing electricity requirements by 28% and reducing thermal energy consumption by 40%. Vecor processes are expected to reduce product-manufacturing costs by 15-25%.



Vecor Tile Top

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