



Ash Development Association of Australia

COAL ASH matters

11
NOVEMBER

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Editorial:

An abstract of the past year

It's been a big year for the Ash Development Association of Australia (ADAA). Conferences held were World of Coal Ash conference, Concrete Institute of Australia's Biennial Concrete 2011 conference and participation in the NSW RTA Pavements 2011, which all provided delegates' with new views from insightful keynote speakers. Key developments for the association included the revision of the Coal Combustion Products Handbook, the development of new ADAA data sheets and the redesign of the ADAA website (which is available for your perusal at <http://www.adaa.asn.au>).

This year has also proven successful in regards to the use of fly ash in new roads projects. The Hunter Expressway involves a fly ash based grout that is injected into boreholes to ensure the large voids left from past mining operations are filled. This project is certainly beneficial for the ADAA in their continuous quest to market the use of fly ash.

These projects, and many more, have made for an interesting and busy year for the association. I would like to wish all Seasons Greetings and a safe and happy new year.



New and improved ADAA website

Fly Ash Aggregates

Aggregates for the general construction industry, as a principal ingredient for concrete, for filtration media, and for agriculture can all be readily made using fly ash. While most manufacture to date has been carried out overseas Australian fly ashes are well suited as a raw feed for the aggregate manufacturing processes.

Manufacturing processes

Fly ash can be readily formed into normal commercial sized aggregates commonly 20mm diameter by rolling on a pelletizing dish. This process is common in other industries where fines need to be agglomerated. The speed and angle of the pelletizing dish can be adjusted to determine pellet size. Other methods i.e. extrusion can be considered but the spherical shaped particles from rolling are useful in the construction industry.

The resulting "green pellet" has little strength and must be handled with care.

There are three principal systems to process the green fly ash pellet into a solid aggregate, fusion or sintering, mixing with cement or lime based products and chemical or geopolymers and is summarised as follows.

- Fusion or sintering. This process requires an optimum loss on ignition (LOI) or carbon content of the fly ash of 6%. If the LOI is lower, adjustment can be made by adding coal washery waste products frequently found as a waste nuisance around power station sites. With this system the green pellets are loaded onto a sinter strand as a bed typically of 300mm depth. The pellets pass under an ignition hood for initial heating. The pellets then continue along the strand with the ignition process continuing



Furnace Bottom Ash



Fly ash



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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
- Delta Electricity
- Eraring Energy
- Flyash Australia Pty Ltd
- Golden Bay Cement (New Zealand)
- Holcim Pty Ltd
- Hyrock Pty Ltd
- Intergen (Millmerran)
- International Power
- Keller Mine Fill JV
- LLIS Industrial Pty. Ltd
- LoyYang Power
- NRG Gladstone Power Station
- Nucrush Pty Ltd
- Pozzolan Enterprises Pty Ltd
- Rio Tinto
- Roads and Maritime Services
- Stanwell Corporation
- TRUenergy
- Vecor Australia
- Verve Energy
- Weston Matrix

RELATED ASSOCIATIONS

- United Kingdom Quality Ash Association (UKQAA)
- American Coal Ash Association CSIRO
- Association of Canadian Industries Recycling Coal Ash (CIRCA)
- Ash Development Association of Australia (ADAA)
- European Coal Combustion Products Association (ECOBA)
- Engineering Institute (IACEE MPEI)
- Japan Coal Energy Center
- Informational & Analytical Center "Ecology of Power Engineering" of Moscow Power
- National Coal Ash Board, Israel
- South African Coal Ash Association (SACAA)

through the bed using the energy in the contained carbon. At the end of the strand final formed aggregates are available for downstream storage.

- Cement or lime based products. With this process cement or lime is mixed with the fly ash usually in the range 5 to 10% by weight depending on the strength characteristics of the final product. The material is then pelletized to the desired size. The resulting green pellets must be handled with care for curing either in natural conditions for up to 28 days or by a temperature accelerated process. The cost of cement or lime has made this process less attractive.
- Chemical or geopolymers. This process is similar to cement or lime but substituting the appropriate chemicals as a binder. Again handling and curing of the green pellets is a down side.

Markets for Fly Ash Aggregates

Fly ash aggregates from any of the processes can be expected to have lower unit weights compared with natural aggregates. This can result in reducing typical concrete densities from 2300 kg cu metre to 1750 kg cu metre. This has major benefits for the construction industry with structures having smaller column sizes. This enables increased lettable areas and hence building value. For these reasons major structures such as the MLC Centre and Australia Square in Sydney and Nauru House in Melbourne are built using lightweight aggregates.

The properties of concrete made with fly ash aggregates are generally enhanced. Water content can be reduced and ASR problems are non-existent. In the UK sintered process fly ash aggregates are specified for road bridge decks and have been used in many prestigious structures including the cantilevered grandstand roof at Twickenham and more recently the new Wimbledon tennis centre.

There are many other uses for fly ash aggregates in general construction, filter media, and agriculture

Summary

There is a natural synergy between the construction and coal fired power station industries in the utilisation of fly ash. Sources of natural aggregates are increasingly harder to find in proximity to markets. The winding down of the major Penrith Lakes aggregate recovery scheme is an example. The cost of quarrying is also increasing with extensive expensive land acquisition for buffer zones required around new quarry sites, furthermore, power stations are becoming under increasing environmental pressure to find sustainable reuse applications. Manufacture of fly ash aggregates would be a positive for the "green star" building scheme that encourages the use of recycled materials. A plant or plants of capacity of 250000 to 500000 tpa is typical of overseas plants and if constructed would substantially increase the current utilisation of Australia's fly ash.



Update: CCP Handbook Second Edition

The Coal Combustion Products Handbook was first released in 2007 following 15 years of black coal research. The original publisher, the Cooperative Research Centre for Coal in Sustainable Development, has entrusted ADAA to take the lead in publishing a second edition.

“This is a major honour given the handbook’s legacy as ‘all things CCP,’” said Craig Heidrich, ADAA Chief Executive Officer, who served as an editor of the first edition, along with Lila Gurba, and Colin Ward.

Updates will encompass new and relevant research, developing markets and trends; key legislative changes and/or exemptions, and brown coal ash information.

Work over the past year has focused on recruiting new authors, review, establishing a table of contents, and creating a leadership commission. The next 12 months will focus on the publication’s various draft stages and reviews by the Editorial Reference Group.

Aim

The editors of this new edition have a few simple aims that will be implemented. The first being to update and include new and relevant research, then to update market developments and trends. Next they are looking to incorporate and update legislative changes and or exemptions as well as incorporate brown coal ash information. And lastly they plan to make other minor amendments within the context of coal combustion products.

Progress to Date

Presently, this project is following an agreed timeline of actions. The stages that have been completed thus far are:

- Table of Contents review
- Establish new content
- Commission new Authors for contribution
- Develop working drafts

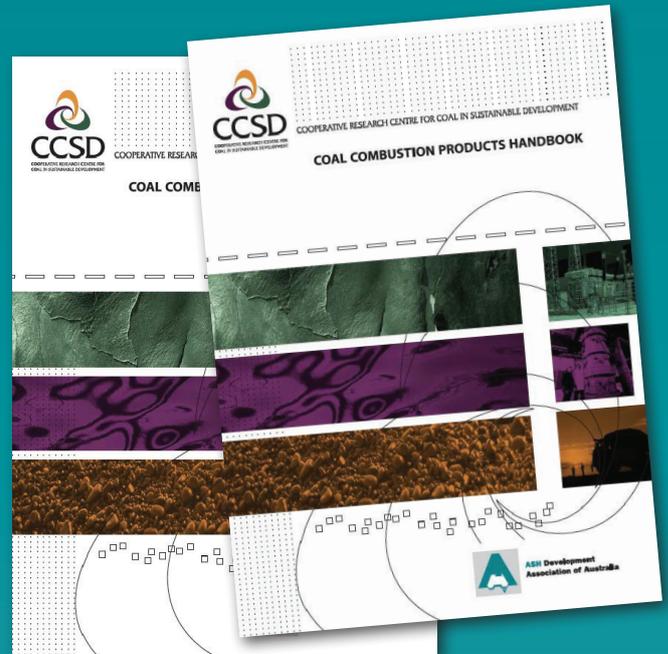
This period of accomplishments has approximately occupied the last 12 months.

Next steps

The upcoming tasks that will be undertaken according to the suggested timeline are:

- Complete working drafts
- Canvas drafts to the Editorial Reference Group
- Final sign-off of content
- Proofing and publishing

These envisaged commitments are predicted for completion in the impending 12 months.



Previous edition of the CCP Handbook under review

Innovative Solution for The Hunter Expressway Project

The Hunter Expressway, a 40-km project in the Hunter Region, NSW, is presenting unique challenges for the RTA. In one section past mining operations left large voids in the ground. Engineers first had to pinpoint the exact location of each then come up with a strategy. Voids within 15 metres of the surface are generally excavated and replaced with compacted soil. Those below 15 metres are filled with a fly ash based grout, which is injected into boreholes.

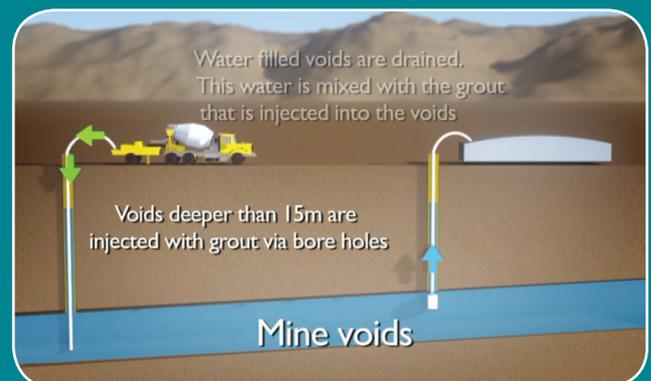
Another section of the project through the Sugarloaf Region involves building three sets of twin viaducts at heights of 34, 37 and 42 metres. These structures’ long spans help reduce the vegetation footprint,

minimising the impact on Aboriginal heritage at Minmi Creek. What’s more, the technique employed of using a fly ash based grout provided good strength and durability, whilst reducing costs.

Investigation work in Sugarloaf, including drilling, started in mid-2010 and mine void drilling started in late 2010. Grouting in Sugarloaf has also been underway since late 2010. The construction of the viaducts through Sugarloaf is scheduled for completion in 2013 and the entire project is scheduled to be finished and opened to traffic at the end of 2013.



The Hunter Expressway project underway



Technical Literature Review, Updates Underway

The National Technical Committee has recently embarked on a major review and update of various technical publications to be completed by the end of 2012, beginning in September 2011. The Association has engaged industry leading experts from EMS (Engineering Materials Solution) to assist the National Technical Committee with the reviews. There will be 9 literature reviews in total, some of which will be entirely new documents, while others are simply reviews of previous material. The application covering Green Star, carbon footprints, NORM's and roller compacted dams are long awaited additions to the associations technical literature.

NEW!

Sustainability Technical Notes

- Sustainability and Green Star (TN11)
- CO2 Benefits Using CCPs (TN12)
- NORMS (TN13)

Marine Reference Data Sheets

- Roller Compacted Dams (RDS 10)

UNDER REVIEW!

Marine Reference Data Sheets

- Service Life of Concrete in a Marine Environment (RDS5)
- Fly Ash Concrete in Marine Environments (RDS6)

Aggregate Reference Data Sheets

- Controlled Low Strength Material in Road Construction (RDS 3)
- Cost Effective Embankment Construction (TN 6)
- Ultra High Fly Ash Pavement Construction (TN 5)



Previous edition of Reference Data Sheet 6 which is currently under review

Literature Currently Under Review

Reference	New Title	Proposed Changes
Fly Ash Technical Note No.5 1996	Pavement Construction and the Role of Coal Combustion Products	<ul style="list-style-type: none"> • Look at current practice and relevant Australian Standards (AS 2758 and related standards) • Look at current road condition at Eraring (any reported information)
Fly Ash Technical Note No.6 1996	Structural Fills and the Role of Coal Combustion Products	<ul style="list-style-type: none"> • The use of fly ash as a fill material needs to be presented differently so it does not sound like an attempt to force more ash into this application, rather emphasise the benefits of Run of Station Ash over other competing products.
Fly Ash Reference Data Sheet No.3 1999	Modified and Stabilised Construction Materials Incorporating Coal Combustion Products	<ul style="list-style-type: none"> • Revamp of majority of article
Fly Ash Reference Data Sheet No. 10 2011	Roller Compacted Concrete and the Role of Coal Combustion Products	<ul style="list-style-type: none"> • A Draft to be prepared based upon the RTA specification for Roller Compacted Concrete and how fly ash /ROS Ash is integral to its successful use. • Base on project work at Cotter Dam • Look at issues and opportunities of using CCPs in RCC • Focus on market needs for information relating to CCPs

Newsbriefs

WOCA 2011- Run and Done!

The World of Coal Ash is an international conference organized by the American Coal Ash Association and the University of Kentucky Centre for Applied Energy Research. The 2011 conference held in Denver, Colorado marked the two organisations' fourth joint biennial meeting. Focusing on the science, applications and sustainability of coal ash worldwide, the event encompassed all aspects of coal combustion products (CCPs), as well as gasification products.

Two keynote addresses opened event. Lisa Bradley, a senior toxicologist with AECOM, presented "Is Coal Ash Toxic"; Anne Weir executive director of Canadian coal ash group CIRCA, presented "A - World Customs Organization's Harmonized System Can Put Coal Ash in a Class of its Own." Both were extremely engaging as they highlighted the diametrically opposed debate ongoing in North America today about CCPs. To listen, visit: www.flyash.info/podcasts.html

Ms. Bradley provided an insightful look at methodologies of how substances are classified as "toxic". The main tenant of her paper was that all substances are poisons; there is none that is not. Dose (exposure) differentiates a poison from a remedy. In other words, all natural and man-made substances can be considered toxic if sufficient exposure to that substance. Drink too much water and it can seriously make you ill.

Ms. Weir's presentation explored the current "product" status of CCPs. The HS is a universal economic language and code for goods, and an indispensable tool for international trade, used by governments, international organisations and the private sector for a variety of policy, legislative and economic purposes. CCPs, if accurately classified under

the HS would: 1) confer legal status of CCPs as an internationally traded commodity; 2) educate; 3) underpin demand and trade; 4) establish the economic significance of beneficial use; and 5) identify CCPs' contribution to sustainable practice against technical ignorance, regulatory barriers and political impulse.

Over the three-day conference a wide range of topic areas were covered, including: environmental, cement and concrete, geopolymers, agriculture, new products, mine and reclamation, regulation and policy, chemistry, ponds, and benefaction. There was an excellent mixture of industry and academic papers with a strong focus on environmental issues.

Our small Australian contingent presented a number of papers. Craig Heidrich with three papers: *Naturally Occurring Radionuclides in Australian Coal Combustion Products (CCPs)*; *Legal Certainty: Why We Need to Change the Waste Paradigm and Supply Chain Approach for Developing New CCPs Opportunities*. Garry Craig presented one paper *The Potential to Re-Use Coal Combustion Products at Eraring Power Station in NSW, Australia*. To view presentations, visit: www.flyash.info

More than 208 papers and 500 registrants from some 24 countries attended the conference - USA, India, South Africa, Spain, Australia, Greece, Canada, UK, Netherlands, Russia, Switzerland, Czech Republic, Germany, France, Poland, Japan, Turkey, China and Mexico. The biennial conference is maintaining its status as the major conference event for all things CCPs.



Pavements 2011

Pavements 2011 was the second biennial NSW Roads and Traffic Authority Pavements Conference, held in Sydney, Sept. 20-21. The ADAA was invited to participate in the event which focused on the engineering structures that principally carry the State's road traffic. These assets are extremely valuable, being worth collectively about \$17 billion.

The conference provided an excellent opportunity for shared lessons between RTA and industry. Approximately fifty industry associations, partners and associates, including key pavement representatives of Austroads, were in attendance.

Craig Heidrich, ADAA's executive director, addressed some 250 attendees, providing updates on RTA activities and the challenges being faced by members. His presentation focused on CCP production and utilization statistics, current industry production, processing and product distribution capability, as well as the significant contributions made by the Association in reviewing the *Australian Standard AS3582.1- Supplementary cementitious materials for use with portland and blended cement Part 1: Fly ash*. Mr. Heidrich also discussed the likely implications of creating new grades of fly ash for use in bound and unbound pavements.

Mr. Heidrich was invited to join a panel for the last session, which was a workshop on sustainability and use of recycled materials for pavements facilitated by Con Lambous & Justin Moss of the RTA. The panel session generated some interesting debate about supply issues for defuse and irregular secondary or recycled materials.



Australia Welcomes Leading Role in WWCCPN

Formed in 1999 as the World Wide Coal Combustion Product Council, the WWCCPN, represents Australia, Europe, Mexico, North America, Poland, Russia and South Africa. Members work together to inform the public, industry and governments about CCPs' beneficial uses. They also share problem-solving strategies, research, and information about new applications.

During the World of Coal Ash conference in May 2011 Charter Members reaffirmed mutual aims to increase awareness of CCPs' role in a sustainable future. The ADAA was appointed Secretariat for the next two years, a considerable responsibility. "We take great pride in supporting this important global coalition," said Craig Heidrich, ADAA's Chief Executive Officer.

Charter WWCCPN Members:

- American Coal Ash Association (ACAA)
- Association of Canadian Industries Recycling Coal Ash (CIRCA)
- Ash Development Association of Australia (ADAA)
- European Coal Combustion Products Association (ECOBA)
- Engineering Institute (IACEE MPEI)
- Japan Coal Energy Center
- Informational & Analytical Center "Ecology of Power Engineering" of Moscow Power
- National Coal Ash Board, Israel
- South African Coal Ash Association (SACAA)
- United Kingdom Quality Ash Association (UKQAA)

To learn more, please visit: www.wccpn.org

CIA Concrete 2011 Conference

The Concrete Institute of Australia's (CIA) 25th Biennial Conference was held in Perth, Western Australia, from Wednesday 12 October to Friday 14 October 2011.

The conference was highlighted by the attendance of three international guest speakers, Professor Ravindra Gettu, Linda Figg and Martin Clarke.

The presence of the ADAA at this conference proved beneficial judging by the popularity of the booth among other delegates. This was evident due to the distribution of over one hundred and fifty (150) ADAA USB's, pre-loaded with the Associations published Technical Information.

Various associated social events were enjoyed by all and really gave delegates a chance to interact with one another and get to know the focus of each association. This began with the welcome reception drinks on the 12 October and was carried on the next night at the very picturesque, Coco's Restaurant. These social events culminated at the Gala dinner on the 14th October where all delegates were invited to acknowledge those who received awards and celebrate a successful conference.



ADAA booth at the Concrete 11 conference in Perth in October

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