Ash Development Association of Australia

COAL ASH matters

09 OCTOBER

CCPs - *a valuable resource*

www.adaa.asn.au

THIS ISSUE - OCTOBER 09'

Editorial: Theory and Practice

Serving to increase awareness of the benefits arising from the effective utilisation of Coal Combustion Products (CCPs) is not a simple, do-from-your-desk job. It involves sample testing, field studies, allying with like minds, attending conferences in international lands, and sooner or later, a proposal (for legislative change, at least).

This issue of *Coal Ash Matters* is designed to reflect the many facets involved in the researching, developing and educating of CCPs. A report on the Hume Highway road project propelled by Blue Circle Ash provides an example of CCP utilisation, whilst an announcement of the Ash Development Association of Australia's (ADAA) recent membership to the Geopolymer Alliance depicts the importance of networking and allying with like minds.

Furthermore, a recount of the World Of Coal Ash conference held in Kentucky, USA, proves that a social, interactive dimension *does* exist within the industry. This edition's *Insider* features a profile on Verve Energy's power stations and lists recent publications and reports prepared by the ADAA and directs readers to available copies of the literature on the Association's website.

For more information on the ADAA, its members and the industry, please visit our website **www.adaa.asn.au**

Collie Fly Ash Stabilises Major Rail Project in WA

Downer EDI Works Pty Ltd undertook major works for WestNet Rail in 2009 on the Northern Railway in the Moora district of Western Australia.

Project works included injecting slurry composed of Collie fine grade fly ash, hydrated lime and potable water to a depth of three metres below the top of the railway sleeper. The underlying purpose of the project was to infiltrate shrinkage cracks and fissures to create a random three-dimensional web of slurry seams.

The seams of slurry imparted strength to the soil where contact was made. The slurry is also semi-impervious to moisture, and as such, prevents free access to the soil by rainfall. This severely retards moisture movement in the soil (wetting and drying) and controls the shrinking and swelling of the clays and silts of which the soil is comprised. The rail track remains even due to the reduced shrinkage and swelling rates. This fly ash and lime slurry injection system is used to improve the punctuality of rail freight transport.

Fine Grade Fly Ash for the project was sourced in bulk tankers from Flyash Australia's modern facilities at Collie Power Station, south of Perth.

This concrete grade fly ash is also being produced for use in many concrete applications in WA. Benefits include improved plastic and hardened properties, improved durability in aggressive environments, and low heat of hydration.

Acknowledgements: John Adamson – *Downer EDI Works Pty Ltd*

Above: slurry injection ring

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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 as **www.adaa.asn.au**

- Adelaide Brighton Cement
- Blue Circle Ash
- Cement Australia
- CEMEX
- CS Energy
- CSIRO (CMIT)
- Delta Electricity
- D2G Joint Venture
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- Tarong North Power Station
- Tarong Energy Corporation
- TRUenergy
- Verve Energy

RELATED ASSOCIATIONS
Energy Supply Association of Australia
www.esaa.org.au

UK Quality Ash Association
www.ukqaa.org.au

American Coal Ash Association
www.acaa-usa.org

Once a waste, not always a waste.

For most of us, thoughts on "wastes" do not linger in our minds beyond the time we dispose of them. But for the Department of Environment Climate Change and Water NSW (DECCW) the situation is a little more complicated.

Among the many responsibilities designated to the DECCW is that of developing, in consultation, industry exemptions for industrial by-products [wastes] to facilitate genuine resource recovery. These exemptions have become commonly know as the three "Fs" [fuel, fertiliser and fill]. Exemptions, once granted, provide categorical distinctions between Coal Combustion Product (CCPs) and wastes which cannot be re-used in further commercial and industrial applications.

Clearly, the Department does not regard wastes as an "out of sight, out of mind" kind of subject. On the contrary, it is a topic very much on its mind, and one constantly subject to review based on new insights gathered from industry consultation, research and project experience.

Proof of this work came in April last year, when the DECCW replaced the waste regulatory framework with new Waste Classification Guidelines for the predominant purpose of simplifying the regulatory framework and providing clearer licensing categories for waste facilities. The Department stated that these changes were designed to assist the regulated community as a whole to fulfill its obligations, whilst supporting the best environmental outcomes.

To this end, the ADAA, being an industry association with a significant interest in waste policy throughout the Australian jurisdictions, supported the DECCW action towards the development of exemption mechanisms in NSW – thus providing industries with the confidence to invest in the further promotion of sustainable industry development, whilst protecting the environment and human health.

In 2008, following extensive consultation over some ten months with the DECCW, the ADAA negotiated and consulted with members situated in NSW, namely; Delta Electricity, Eraring Energy, Macquarie Generation, Adelaide Brighton Cement, Blue Circle Ash, Flyash Australia, Hyrock, Cement Australia, Cemex and the Roads Traffic Authority of New South Wales and subsequently produced a draft "General Exemption" for Coal Combustion Products (CCPs). At publication, the Association is awaiting notification of the granting of the general exemption.

Not all thoughts on wastes are a waste of time. Evidently, one industry's wastes, are another industry's input materials.

An updated version of the Classification Guidelines are available on the DECC's website at **http://www.environment.nsw.gov.au/waste/envguidlns/index.htm.**

Around the Power Stations: Verve Energy

Working in collaboration with Flyash Australia, Verve Energy operates in the relatively small Western Australian fly ash market to research innovative and environmentally-friendly uses of fly ash and promote its acceptance by the Government, industry and general public.

A long-time supporter of fly ash research, Verve Energy has participated in numerous projects and trials of fly ash in a variety of applications by various Western Australian universities and collaborative organisations, such as the CRC for Coal in Sustainable Development.

Verve Energy produces up to 280,000 tonnes of fly ash each year from the burning of coal. Approximately 20,000 tonnes of this amount is re-used. Bottom ash makes up about 40,000 tonnes of the annual fly ash production, much of which is used 'in house' to build ash dam walls. The bulk of the fly ash is converted to slurry for transport and stored in these ash dams, awaiting some future re-use opportunities.

Verve Energy owns the three major coal-fired power stations in Western Australia. The most modern of the three is the Collie Power Station, located 10km north of Collie. The power station opened in 1999 and has one 340MW unit. Collie coal is sub-bituminous and is a relatively volatile coal but has a relatively low ash content of 6%.

Muja Power Station also belongs to Verve Energy, located 20km south east of Collie, and features four units with a total generating capacity of 854MW. The last of the three, Kwinana Power Station, is located about 40km south of Perth and can burn coal, gas or oil – making it unique in Western Australia.

Muja and Collie power stations can store a limited amount of dry fly ash on site and have the facilities to load dry fly ash which is handy for the marketing arrangement with Flyash Australia.

The three power stations use over 4.5 million tonnes of coal each year from the Collie coal basin, about 200km south of Perth. With a total installed generating capacity of more than 1800MW, Verve Energy's three power stations supply energy for the South West Interconnected System (SWIS) which covers the populated south west corner of Western Australia.

In pursuing these efforts, Verve Energy strives to find practical, on-going and long-term uses for fly ash – a venture which it considers to be mutually beneficial for both itself and the environment.

Putting Words into Deeds

The Ash Development Association of Australia (ADAA) and its members annually deal with a lot of Coal Combustion Products (CCPs) - 14.5 million to be exact - of varying physical (fine powders to coarse aggregates) properties. But one thing it does not engage in is mere puff. When the Association states as its aim to 'conduct research and technology transfer on behalf of members to assist in developing market opportunities in the use of CCPs for all stakeholders' it is not merely striving to fill space on its website.

Over the last 12 months, the ADAA has been busy collecting samples of fly ash, conducting tests, assessing physical and chemical properties, NORM classification and is currently in the process of revising and publishing up-to-date technical literature on the latest industry research and development. Evidently, the ADAA is a firm believer in a little less conversation, a little more action.

Here is just a brief summary of what has been completed in recent months by the Association to increase user awareness of the benefits arising from the effective utilisation of this valuable mineral by-product:

Environmental Monitoring Program 2009

The Association annually undertakes an assessment of the chemical characteristics and leaching behaviour of CCPs from member generators and suppliers from across Australia. Results of the assessment are reported annually to demonstrate the ongoing consistent nature of CCPs and confirm the very low earth metal concentrations and leachability of CCPs. Results are compared with specified State government exemption requirement limits to demonstrate they are appropriate for industrial and commercial use. A report summarising the aim, procedure and results of this assessment has been prepared and published by the Association, and is available for free downloading at **http://www.adaa.asn.au/docs/ADAA_EMP_2008.pdf**

CCP Handbook

In 2007, the Cooperative Research Centre for Coal in Sustainable Development (CCSD) and the ADAA jointly published the Coal Combustion Products Handbook. The product of many years of Australian-based research by local science and industry sectors, the handbook provides knowledge for CCP producers, civil engineers, researchers, contractors, operators, planners designers, architects and others within the industry, on the various ways to productively use CCPs. Given the rapidity of industry development and new research, the ADAA is currently in the process of revising the handbook and is preparing to launch a second edition in early 2011. A project a few years in the making, the Association will be inviting members and other interested parties an opportunity to contribute towards this revision.

NORMS Testing

The objective of this study was to update the current knowledge of the ADAA and its members on the available data for CCPs, as they relate to naturally occurring radioactive material or NORM. Accordingly, the assessment sought to update current published data on:

- low radionuclide concentrations present in CCPs;
- any consistencies/inconsistencies with the results from previous studies; and
- comparison with background radionuclide concentrations in soils.

The results of this study showed that all of the fifty-two CCPs samples were considered exempt from a regulatory perspective, since no single radionuclide was above the nationally and internationally accepted limit of 1 Bq/g or 1000 Bq/kg for radionuclides of natural origin or above 10,000 Bq/kg for 40K. Results from this study compared well with previous studies conducted by The Australian Radiation Laboratory (now ARPANSA) and further demonstrated the consistency of the materials over longer time frames (20 years).

The radionuclide concentrations for the fine and medium fly ashes are either within or not significantly higher than the specified ranges for background soil concentrations. Likewise, the Run-of-Station (ROS) bottom ashes are all within these stated ranges. A full copy of the report is available on the Association's website, at the following link: **http://www.adaa.asn.au/docs/ADAA_Report_on_Radioactivity_in_CCP_2008.pdf**

Technical Notes and Reference Data Sheets

The publication of technical notes and reference data sheets is nothing new to the ADAA. These documents have been a strong underpinning of the technology transfer objectives for the association. However, as industry research and development progresses, so too must our literature. The Association is currently in the process of editing, revising and republishing some of its research notes and guides. The finished products will be made available for free download on the Association's website in the coming months. ADAA Members will receive a notification email and a link upon the completion of each publication. The ADAA has recently published a reference data sheet on Post-Tension Structural Fly Ash Concrete which is available for download at the following link: **http://www.adaa.asn.au/docs/Ref_Data_Sheet_9.pdf**

Southern Hume Highway Road Projects

In early 2008, Blue Circle Ash commenced supply of fine grade Flyash Australia from Mt Piper power station to three major civil projects along the Hume Highway in Southern NSW, namely, the Northern Hume Alliance project undertaken by Leighton, and the Coolac Bypass and Hume Highway Southern Alliance projects both undertaken by Abigroup.

In total, the three major road construction projects required approximately 70,000 tonnes of fine grade fly ash for the construction of the road pavement. The subbase (lean mix concrete) contained 160kg/m^3 of fine grade fly ash, while the base coarse (continually reinforced concrete) contained 80kg/m^3 of fine grade fly ash.

A servant of three masters, Blue Circle Ash's seemingly simple task of supplying fly ash was complicated by the fact that three projects were run simultaneously and tended to peak at synchronised times. The highest peak of demand was reached in February 2009, when more than 6,000 tonnes of fine grade fly ash was collectively consumed by the three projects.

Furthermore, the task of delivering the fly ash presented a logistical nightmare, given the large volumes of fly ash required to be transported, and the long distances to be traveled by road, a 320 – 470km trek standing between the power station and the project sites.

To alleviate the peak daily demand requirement, Blue Circle placed mobile storage silos at each of the batch plant sites and after-hours replenishment of plant and storage silos. Additionally, Blue Circle established a 800 tonne buffer stock at the Canberra depot to ensure continued supply should any shortages of fly ash have occurred. In April 2009, this supply chain proved invaluable when Mt Piper power station was completely taken out of service, resulting in no fly ash being produced. The flexibility of the supply chain allowed uninterrupted fly ash supply to all three projects and no delays to the contractors on these projects.

The supply of fine grade fly ash to such large civil projects also involves much quality control and quality assurance. To this end, Flyash Australia implemented a testing regime to check every load of fly ash delivered and reported each of their results to the civil contractors. This allowed the contractors to make mix design adjustments based on the properties of each load of fly ash.

As of August 2009, these three projects have reached completion or are due to be completed in the near future. Despite the minor mishaps and logistical complexities, the projects were a terrific achievement for all those involved and a great testimony to the use of fly ash in road construction.

Acknowledgement: *Zoran Skoric, Blue Circle Ash*

Sustainability Capacity Building Program

With the support of Sustainability Victoria, the Ash Development Association of Australia (ADAA) has recently launched its "Sustainability Capacity Building Program" designed to contribute towards the Association's broad aim of increasing the effective utilisation of Coal Combustion Products (CCPs). Spanning over an 18 month period, the program is centred on businesses operating in Victoria, consisting of both members and non-members of the ADAA.

Coal Combustion Products are a valuable resource. Annually, Victoria alone generates approximately 1,300,000 tonnes of the products. However, much of this is currently ineffectually utilised, due primarily to a lack of awareness and understanding of the beneficial properties and characteristics of the resource, coupled with the unidentified areas of its potential reuse and associated benefits (economic & environmental) that can be derived.

For this reason, the ADAA proposes to work with industry businesses to build the capacity to increase the current effective utilisation of CCPs.

As part of the Sustainability Capacity Building Program, a benchmarking workshop was successfully conducted in early September at the CSIRO Clayton facility in Melbourne. Dr Alice Woodhead from Link Strategy facilitated the workshops, aimed to measure the resource impacts of CCPs and to establish benchmarks for resource use across the industry supply chain.

Companies participating in the workshop, whilst identifying and discussing the challenges involved in the process, also indicated strong enthusiasm for building new partnerships in the CCP supply chain and voiced their support for the project as a valuable opportunity to work with new companies and the Victorian Government.

Further details and findings from the program will be published on both the ADAA website and in future editions of *Coal Ash Matters* as the program progresses.

If you require further information on the program please contact Niribi Charker (Project Manager) on 02 4225 8466 or email at **ncharker@hbmgroup.com.au.**

New Kid on the Block

In the Coal Combustion Products (CCPs) industry, great minds don't just think alike, they ally. Given their commonality of purpose, that is, to enhance the sustainability of the mining, power generation from coal and the construction materials industry by promoting the uptake of CCPs as mutually beneficial for all industry stakeholders, the environment and the community, the ADAA has recently accepted an invitation to partake as a member of the Geopolymer Alliance.

An initiative proposed by the Centre of Sustainable Resource Processing (CSRP), the Geopolymer Alliance aims to bring together research institutes, the engineering fraternity, government authorities, industrial waste (by-product) generators, cement manufacturers, chemical suppliers, concrete aggregate suppliers, concrete manufacturers, infrastructure owners and industry regulators to cooperatively develop mutually beneficial applications for geopolymer technology.

The Association has nominated its CEO, Craig Heidrich, as its representative and is currently in the process of discussing research and market development opportunities to propose to the Alliance. Stay tuned for updates on the Association's involvement in the Geopolymer Alliance in the coming months.

More information on the Geopolymer Alliance can be found at the CSRP website at **http://www.csrp.com.au/projects/ga.html.**

World Of Coal Ash (WOCA) Conference

Hosted by the American Ash Association and CAER University of Kentucky, this year's World Of Coal Ash (WOCA) conference was held in Lexington, Kentucky. Taking place in early May, the international conference was attended by the ADAA's Executive Officer, Mr Craig Heidrich, who claims that the quality of this year's conference had exceeded that of previous years – even during the so-called GFC (Global Financial Crisis) not to be confused with KFC.

Since its inception in 2003, the WOCA conference has been held on a biennial basis, attracting registrants from all corners of the world, and providing them with a forum to 'meet and discuss the science and applications for Coal Combustion Products (CCPs), and to transfer knowledge and ideas that will benefit their innovative utilisation, handling and safe storage'. This year, the conference was attended by an impressive 480 registrants from over 29 countries.

This year's plenary speakers – Michael T Scott from the Kingston Ash recovery project, Matt Hale from the US EPA Office of Solid Wastes, and Tom FitzGerald from the Kentucky Resources Council – addressed various topics including aggregates, policy, chemistry, geopolymers, mine placement and reclamation and environmental management.

Mr Heidrich noted that the papers presented at the conference consisted of an impressive balance between academic and commercial topics. Included amongst the quality Australian papers submitted at the conference were a series of Chemistry/Mineralogy journals discussing the characterisation, properties and applications of CCPs.

The papers presented at the conference, including the aforementioned, are available for download at the WOCA website **(www.worldofcoalash.org)** along with photos, summaries and notes on the conference.

The next WOCA conference is scheduled to take place in Denver, Colorado in 2011. Details of the program and registration will be advertised via the Association's website and in future editions of *Coal Ash Matters* closer to the time.

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