

Applied Science Advice

1 REQUEST DETAILS

REQUEST DETAILS											
PORTAL/ IBIS NO.											
CLIENT	Pushan Shah - SA EPA										
CAN ADVICE BE ADDED TO KNOWLEDGE BANK?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No										
CONFIDENTIALITY	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Stack test reports contain confidential material.										
ENVIRONMENTAL SEGMENT / DISCIPLINE	<table border="0"> <tr> <td><input type="checkbox"/> Wastewater</td> <td><input type="checkbox"/> Waste</td> </tr> <tr> <td><input type="checkbox"/> Landfill</td> <td><input type="checkbox"/> Water</td> </tr> <tr> <td><input type="checkbox"/> Odour</td> <td><input type="checkbox"/> Groundwater</td> </tr> <tr> <td><input type="checkbox"/> Noise</td> <td><input type="checkbox"/> Land</td> </tr> <tr> <td><input checked="" type="checkbox"/> Air</td> <td><input type="checkbox"/> Human health</td> </tr> </table>	<input type="checkbox"/> Wastewater	<input type="checkbox"/> Waste	<input type="checkbox"/> Landfill	<input type="checkbox"/> Water	<input type="checkbox"/> Odour	<input type="checkbox"/> Groundwater	<input type="checkbox"/> Noise	<input type="checkbox"/> Land	<input checked="" type="checkbox"/> Air	<input type="checkbox"/> Human health
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ISSUES/ACTIVITIES	Review of trial burning of recycled construction and demolition containing up to 20% plastic waste in a cement kiln										
EXPERT(S)	John Frame										
PEER REVIEW REQUIRED/RECOMMENDED <i>(use decision matrix in SOP)</i>	<table border="0"> <tr> <td><input checked="" type="checkbox"/> Yes If yes, level recommended: <input type="checkbox"/> high <input checked="" type="checkbox"/> medium <input type="checkbox"/> low</td> <td><input type="checkbox"/> No If no, why not: <input type="checkbox"/> standard advice <input type="checkbox"/> low risk/low complexity <input type="checkbox"/> not available <input type="checkbox"/> other:</td> </tr> </table>	<input checked="" type="checkbox"/> Yes If yes, level recommended: <input type="checkbox"/> high <input checked="" type="checkbox"/> medium <input type="checkbox"/> low	<input type="checkbox"/> No If no, why not: <input type="checkbox"/> standard advice <input type="checkbox"/> low risk/low complexity <input type="checkbox"/> not available <input type="checkbox"/> other:								
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PEER REVIEW REQUEST: SCOPE AND TYPES	<table border="0"> <tr> <td>Scope: Check of technical assessment</td> <td>Types: <input checked="" type="checkbox"/> technical <input type="checkbox"/> language and style <input type="checkbox"/> science communications <input type="checkbox"/> strategic alignment</td> </tr> </table>	Scope: Check of technical assessment	Types: <input checked="" type="checkbox"/> technical <input type="checkbox"/> language and style <input type="checkbox"/> science communications <input type="checkbox"/> strategic alignment								
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PEER REVIEWER(S)	Jason Choi										
PEER REVIEW DETAILS											

2 BACKGROUND

Adelaide Brighton Cement Ltd (“ABCL”) operates a dry cement kiln located at Birkenhead in SA. ABCL uses natural gas (“NAG”) to make clinker with up to 15 tonnes of waste per hour used to replace NAG as a supplementary fuel. The supplementary fuel is recycled construction and demolition (RCD) waste.

From the information in the application it is assumed that the cement making process consists of a calciner and kiln that are fuelled separately. Calcining (converting the CaCO_3 to CaO by driving off CO_2) occurs at a much lower temperature compared to the kiln where process temperatures must reach 1400°C to make cement.

The current site approval to burn the waste as supplementary fuel limits the amount of plastic to 10%. ABCL has conducted a trial burn to support an application to SAEPA to increase the percentage in plastic from 10% to 20%.

3 REVIEW PROCESS

A desktop analysis of recent emission (“stack testing”) has been conducted to determine whether the increase in plastic in the RCD alters or increase emissions.

Stack test results for 2003, 2014, 2015 and 2016 have been provided. Also provided is ABCL application for the increase in waste which provides emission tests at 20% plastic in the RCD.

4 RATIONALE

The application indicates that the supplementary fuel is burned in the calciner and its emissions are vented to the atmosphere via Stack 4B.

Cement kilns have large flows of alkaline material (CaO) and it is unlikely that significant emissions of acid gases (HCl , Cl_2 , fluoride(s) or SO_2) will occur. Likewise, the metals will be adsorbed on the limestone. These metals will be discharged in the cement as a minor contaminate or removed from the process by the kiln bypass dust. The kiln bypass dust is removed to remove alkali metals in the cement and ensure the quality of the cement.

Stack test results shows that tests from Stack 4B are within the same range as existing test results taken from 2003-2016.

Metals

Emission testing for metals (including mercury, cadmium, nickel and chromium (IV)) shows that emissions are generally low as would be expected for the alkaline environment in the calciner and kiln.

Care should be taken with semi volatile metals such as selenium, thallium and cadmium. There is some evidence from a cement kiln in Victoria that these metals build up until an equilibrium concentration within the kiln is exceeded and results in a “puff” of these metals being discharged. It is not expected the increased concentration of plastic will increase flow of these metals within the kiln and calciner.

PAHs

As there are usually long residence times and moderate to high temperatures in the cement making process combustion is usually complete. As a result, emissions of PAHs are expected to be low. This is confirmed by the emission results

Dioxins and Furans

Dioxins and furan measurements are low (less than 0.1 ng/m^3 I-TEQ) This is consistent with international experience in burning waste in cement kilns (see Kartensen K H, Formation, release and control of dioxins in cement kilns, Chemosphere, 70, pp 543-600, 2007).

5 OTHER ISSUES

In general, for combustion processes measurements of indicators should be normalised to a constant oxygen concentration. This enable a consistent comparison when one of the process inputs is oxygen which is in the primary and secondary air supplies.

6 CONCLUSION AND RECOMMENDATION

That the emission testing shows that for the reported testing that emissions from the cement kiln are not altered by the increase of plastics in the recycled construction and demolition supplementary fuel.

There is nothing in the data supplied or this assessment that shows any permission to increase the percentage of plastic in the recycled construction and demolition waste used as fuel should not have been issued.

7 DOCUMENT APPROVAL AND PEER REVIEW TRACKING

Version control and details				
Date	Expert	Draft/Final	Summary of Changes / Peer Review Details	Peer Reviewer
16-May-18	John Frame	DRAFT	Jason Choi	