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CEMENT & CONCRETE INDUSTRIES WORK TOGETHER TO ADDRESS ALKALI INCIDENT

The cement and concrete industries are working together to manage any impact on customers who unwittingly purchased bulk cement with higher than declared mean alkali levels from Lafarge Cement UK's Westbury Works in Wiltshire between September 2002 and December 2004.

Lafarge recently discovered that alkali test data at its Westbury Works had been deliberately misreported during this period. As a result, a number of ready-mixed concrete producers inadvertently supplied non-conforming concrete to customers in the South West of England.

After completing a detailed investigation to identify what happened, Lafarge has confirmed that this incident was isolated to Westbury Works. The true alkali data for the period was documented and has now been made available. The company has been working with the readymixed concrete producers to whom it supplied Westbury cement during the period, sharing all technical data and meeting its responsibilities in dealing with the problem.

Concrete is inherently alkaline. However, in certain conditions, high levels of alkali have been linked to the development of damaging alkali silica reaction (ASR) to an extent that it causes the concrete to expand and crack. For damaging ASR to occur, all of the following factors must be present: high levels of alkali in the concrete; reactive aggregates; and the presence of moisture.

Potential consequences of the Westbury incident are restricted to:

- concrete made with Portland cement from Westbury Works (which supplies plants in Avon, Berkshire, Devon, Dorset, Gloucestershire, Hampshire, the Isle of Wight, Oxfordshire, Somerset and Wiltshire)
- ready-mix concrete only
- high strength concrete (with cement content generally in excess of 450 kg/m³)
- concrete placed between September 2002 and December 2004

Concrete containing at least 25% or more of pulverised fuel ash (pfa) or more than 40% ground granulated blast furnace slag (ggbs) is highly unlikely to be affected.

An independent report commissioned by Lafarge from Professor Les Clark OBE, an acknowledged authority on the structural effects of ASR, concludes that the risks of the Westbury cement supplied during the period resulting in the development of damaging ASR are generally minimal. Professor Clark reported that, for a high risk of damaging ASR to develop, the alkali content of the concrete needs to exceed $4.5 \text{ kg/m}^3 \text{ Na}_2\text{O}_{\text{eq}}$. For this to happen the cement contents have to be high and levels generally in excess of 450 kg/m^3 are needed before there is a need for further investigation. Below this level, the risk of damaging ASR is minimal.

A close analysis by the ready mix companies has isolated less than $1,000 \text{ m}^3$ of concrete with an alkali level of more than $4.5 \text{ kg/m}^3 \text{ Na}_2\text{O}_e$ and customers who received this concrete have been advised.

Professor Tom Harrison, technical director of the British Ready Mix Concrete Association product committee of the Quarry Products Association and chairman of the BSI concrete committee explained that: “A higher alkali level in cement does not automatically mean that damaging ASR will develop as the provisions in BS 8500-2 have a large safety factor to accommodate unforeseen events. While this incident has led to a number of technical non-conformities, very few of these will lead to any significant risk of damaging ASR.”

The producers’ analysis of ready mix concrete mix designs over the two-year period has identified a very small proportion of concrete supplied in the South West that is of concern and may require monitoring for the potential development of damaging ASR. All purchasers of concrete that could be affected have been informed; the ready mix companies and Lafarge will be working with them to assess whether the other factors needed to trigger ASR are present and if any further action needs to be taken.

Mike Gilbert, chief executive of the British Cement Association, said: “We are confident that this incident at Westbury has been successfully addressed. The company’s new testing and reporting procedures, which include additional testing on site, cross checking systems and auditing of the results, will ensure that it remains an isolated incident that cannot happen again.”

“The cement and concrete industries have responded to this matter in a responsible manner,” said Ian Cox, chief executive of The Concrete Centre. “We understand that the risks of structures being

affected by damaging ASR are minimal and are focusing on providing any support that end users might need in understanding if it has any impact for them.”

Help and guidance is available in the first instance from Lafarge Cement UK (Help Desk Tel: 0870 6090011) and the concrete suppliers in the South West.

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Notes to editors:

- The **British Cement Association (BCA)** is the trade and research organisation that represents the interests of the United Kingdom’s cement industry in its relations with Her Majesty’s Government, the European Union and relevant organisations in the United Kingdom. The members of the BCA (Buxton Lime Industries, Castle Cement, Lafarge Cement UK and Rugby Cement) are the major domestic manufacturers of Portland cement producing over 90% of the cement sold in the UK.

The cement industry has an annual turnover of £750 million and is a major supplier to the construction industry. It employs around 3,500 people directly with a further 15,000 jobs depending upon its operations. Website: www.cementindustry.co.uk.

- **The Concrete Centre** is the central market development organisation for the £5 billion UK concrete sector. The Centre works in the interests of all those involved in concrete design and construction. It focuses on design and construction methods, education and training, research, new product and process development and the performance of concrete in practice. The Centre works closely with other well-established cement and concrete bodies in the UK. Assistance is available from the centre’s Helpdesk 0700-4 500 500, or visit www.concretecentre.com.
- The **Quarry Products Association** is the principal trade association representing the UK aggregates industry. In England, its members produce over 90 per cent of aggregates extracted - sand and gravel and crushed rock as well as other non-aggregate minerals such as silica sand, agricultural and industrial lime including limestone, chalk, clay and shale for cement. Website: www.qpa.org
- The **Concrete Society** can provide general guidance and information on ASR; Tel: 01276-607140 or visit www.concrete.org.uk

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