

# LEHIGH

## HEIDELBERGCEMENT Group

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### CEMENT TEST REPORT

**Plant:** Conch **Report Date:** 2/11/2008  
**Location:** Stockton Terminal, Stockton, CA  
**Specification:** ASTM C150-04a & ASTM C150-02a Type II-V, Low Alkali  
**Ship:** M/V Ten Shou Maru - December 2007

| STANDARD CHEMICAL REQUIREMENTS<br>ASTM C 114        | TEST RESULTS | ASTM C 150 SPECIFICATIONS |                        |
|---|--------------|---------------------------|------------------------|
|   |              | TYPE II                   | TYPE V                 |
| Silicon Dioxide (SiO <sub>2</sub> ), %              | 21.2         | 20.0 Min                  | ----                   |
| Aluminum Oxide (Al <sub>2</sub> O <sub>3</sub> ), % | 3.9          | 6.0 Max                   | ----                   |
| Ferric Oxide (Fe <sub>2</sub> O <sub>3</sub> ), %   | 4.5          | 6.0 Max                   | ----                   |
| Calcium Oxide (CaO), %                              | 65.2         | ----                      | ----                   |
| Magnesium Oxide (MgO), %                            | 1.1          | 6.0 Max                   | 6.0 Max                |
| Sulfur Trioxide (SO <sub>3</sub> ), %               | 2.2          | 3.0 Max                   | 2.3 Max                |
| Loss on Ignition (LOI), %                           | 1.34         | 3.0 Max                   | 3.0 Max                |
| Insoluble Residue, %                                | 0.3          | 0.75 Max                  | 0.75 Max               |
| Alkalies (Na <sub>2</sub> O equivalent), %          | 0.36         | 0.60 Max                  | 0.60 Max               |
| Tricalcium Silicate (C <sub>3</sub> S), %           | 65           | ----                      | ----                   |
| Dicalcium Silicate (C <sub>2</sub> S), %            | 12           | ----                      | ----                   |
| Tricalcium Aluminate (C <sub>3</sub> A), %          | 3            | 8 Max                     | 5 Max                  |
| Tetracalcium Aluminoferrite (C <sub>4</sub> AF), %  | 14           | ----                      | ----                   |
| 2(C <sub>3</sub> A) + C <sub>4</sub> AF %           | 19           | ----                      | 25 Max                 |
| PHYSICAL REQUIREMENTS                               |              |                           |                        |
| (ASTM C 1038) Expansion @ 14 days,%                 | 0.005        | 0.020 Max <sup>1</sup>    | 0.020 Max <sup>1</sup> |
| (ASTM C 204) Blaine Fineness, m <sup>2</sup> /gm    | 350          | 280 Min                   | 280 Min                |
| (ASTM C 430) -325 Mesh, %                           | 96.7         | ----                      | ----                   |
| (ASTM C 191) Time of Setting - Initial (Vicat)      | 116          | 45 Min                    | 45 Min                 |
| (ASTM C 191) Time of Setting - final (Vicat)        | 235          | 375 Max                   | 375 Max                |
| (ASTM C 451) False Set, %                           | 84           |                           |                        |
| (ASTM C 185) Air Content, %                         | 7.7          | 12 Max                    | 12 Max                 |
| (ASTM C 151) Autoclave Expansion, %                 | -0.100       | 0.80 Max                  | 0.80 Max               |
| (ASTM C 187) Normal Consistency, %                  | 24.8         | ----                      | ----                   |
| (ASTM C 109) Compressive Strength, psi (MPa)        |              |                           |                        |
| 1 Day   | 2132 (14.7)  | ----                      | ----                   |
| 3 Day   | 3889 (26.8)  | 1500 (10.3) Min           | 1160 (8.0) Min         |
| 7 Day   | 4472 (30.8)  | 2500 (17.2) Min           | 2180 (15.0) Min        |
| 28 Day - Test in Progress                           | 6061 (41.8)  | ----                      | 3050 (21.0) Min        |

This cement meets the requirements of specification: ASTM C150-04a Type II/V, Low Alkali  
 Caltrans Section 902.01 - Type II/V Modified  
 ASTM C150-02a Type II/V, Low Alkali

Matthew D Zapadka

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 Plant Chemist

<sup>1</sup> Required if SO<sub>3</sub> is over 2.3%