RESURRECT CLINKER SAMPLE EXCHANGE PROGRAM

What, Why, and How

Hugh Hou, Chair, Clinker Sample Exchange Committee
Program and History

- Started in 1979
- Microscopists evaluated clinkers from same sources
- Results compiled and compared to improve the techniques and promote microscopy
- “...... review and evaluation” (Shkolnik and Hills, ICMA, 1995)
- Phased out since mid 1990s
Objectives/Goals

- Resume the program
- Recruit committee members and participants
- Get the ball rolling
- ACT
Why Participate?

- Thousands of cement manufacturers worldwide
- Frequent production / quality issues and problems
- You can help
Clinker Microscopy: Capabilities
(Campbell, 1996; Du Toit, 2017)

- Evaluate heating rate, maximum temperature, time at high temperature, and cooling rate (Ono's Method)
- Predict 28-day mortar-cube strength
- Assess cement performance / quality issues
- Assess effects of cement-plant equipment, process or raw feed changes
- Evaluate clinker grindability or efficiency of clinker-grinding process
- Determine clinker weathering during storage
Why Participate?

- See where you are and sharpen your skills
- Win raffled prizes
How to Participate

- Fill the form and return, indicating your interests:
  - Clinker sample provider
  - Microscopist
  - Chemist, QA/QC Staff
  - Committee member
  - All of above

- Bring your ideas and attend a kick-off meeting
Fill Participation Form

Name: 
Affiliation: 
Emails: 
Phone: 
Fax: 

I am interested in (check one or all of them):

- Clinker sample provider
- Microscopist
- Chemist, QA/QC Staff
- Committee member
- All of above

Return to: Hugh Hou at hhou@wje.com
Questions?
### ICMA SAMPLE EXCHANGE PROGRAM

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<th>Sample No:</th>
<th>Sample Sent by:</th>
<th>Date:</th>
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| Sample From: | | |

#### Ono Method:

- Alite Average Size: 
- Alite Birefringence: 
- Belite Average Size: 
- Belite Color: % Clear: % F: % Y: % A: 
- Ono Predicted Strength: PSI

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#### Polished Section:

- Alite Average Size: 
- Alite Birefringence: 
- Belite Average Size: 
- Belite Birefringence: 
- C3S/C3A Ratio: 
- Matrix Differentiated: 
- Reflectivity of Ferrites: 
- Alkali Aluminates: 
- Free Lime: 
- Periclase: 
- Pores/Grindability: 
- Point Count: C3S: % C2S: % C3A: % C4AF: % F.L.: %

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<th>Periclase: %</th>
<th>Pores: %</th>
<th>Total Points:</th>
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#### Thin Section:

- Alite Size: Birefringence: Morphology: 
- Belite Size: Color: 

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#### Results From: 

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### I POLISHED SECTION METHOD (cont.)

**Point Count:**

- C₃S: _____%  
- C₅S: _____%  
- C₃A: _____%  
- C₄AF: _____%

**Free Lime:** _____%  
**Precipitate:** _____%  
**Pores:** _____%

**Total Points Counted:**

**Comments:**

### II THIN SECTION:

- **Alite**
  - Average Size: _____ μm  
  - Birefringence: 
  - Morphology:  
  - (cubical, orthorhombic, subhedral, ...)

- **Belite**
  - Average Size: _____ μm  
  - Color:  
  - (clear, pale yellow, yellow, amber)

**Lamelle Condition:**

- (multidirectional, parallel, "ragged", ...)
- (round, ameboid, ...)

**Crystal Distribution:**

- (mostly in clusters, some in clusters, individual crystals)

**Periclase**

- Amount: _____%  
- Morphology:  
- (idiomorphic, dendritic)

**Free Lime**

- Amount: _____%  
- Distribution:  
- (tightly packed clusters, individual crystals, ...)

**Interstitial/Matrix**

- Reflectivity of Ferrite: 
- (bright, moderate, dull)
- Alkali Aluminate Amount: _____%  
- Alkaline Sulfate Amount: _____%

**Porosity:**

- Amount: _____%  

### III ONO METHOD:

- Use of KOH Extraction  
  - Yes  
  - No

- **Alite**
  - Average Size: _____ μm  
  - Birefringence:

- **Belite**
  - Average Size: _____ μm  
  - Color:
  - (Clear, Pale Yellow, Yellow, Amber)

- Predicted 28-day Compressive Strength: _____ psi

**Comments:**