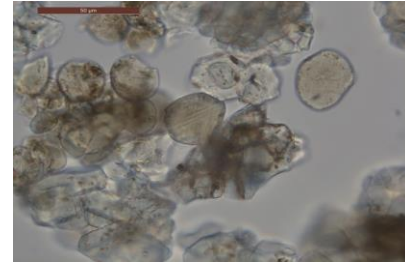
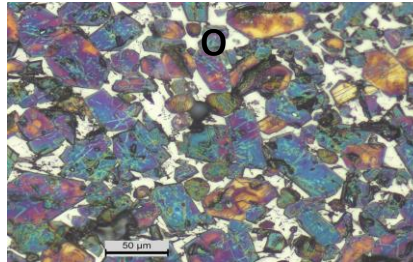
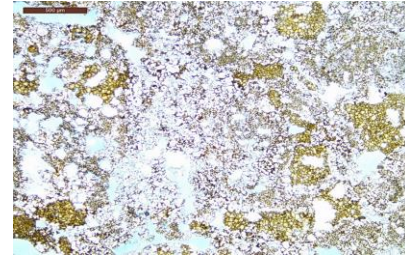
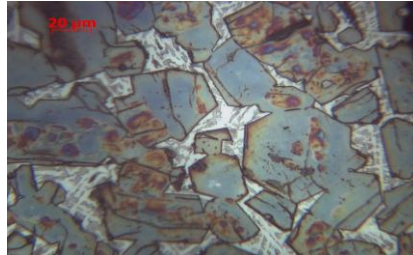
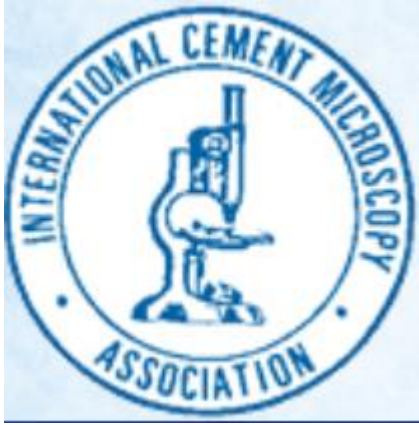


WJE

RESURRECT CLINKER SAMPLE EXCHANGE PROGRAM



What, Why, and How

www.wje.com

WJE | ENGINEERS
ARCHITECTS
MATERIALS SCIENTISTS

Wiss, Janney, Elstner Associates, Inc.

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**

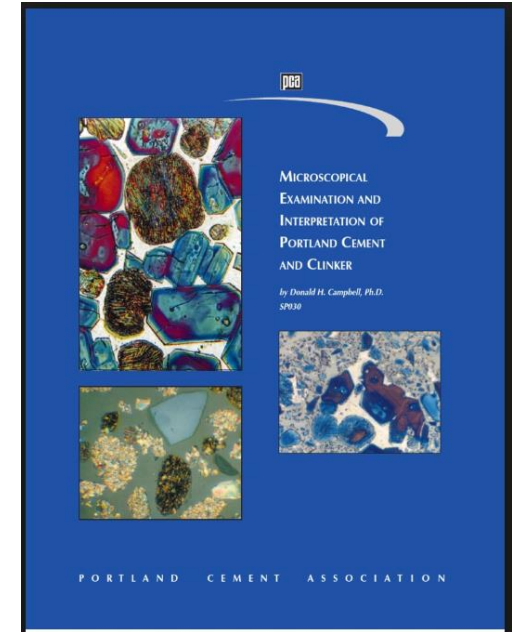
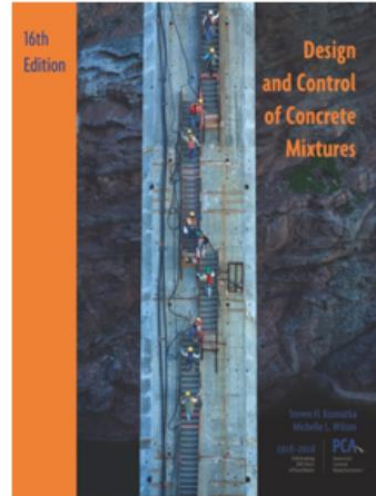
Clinker Microscopy: Capabilities

(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

Sample No: _____ Sample Sent by: _____ Date: _____

Sample From: _____

Ono Method:

Alite Average Size: _____ Size Range: _____

Alite Birefringence: _____

Belite Average Size: _____ Size Range: _____

Belite Color: _____ % Clear _____ % F.Y. _____ % Y _____ % A

Ono Predicted Strength: _____ PSI

Comments: _____

Polished Section :

Alite Average Size: _____ Size Range: _____ Edge Condition: _____

Belite Average Size: _____ Size Range: _____ Edge Condition: _____

Is Belite Predominately in Clusters: _____

Is Matrix Differentiated: _____ C₃A/C₄AF Ratio: _____

Reflectivity of Ferrite: _____ Alkali Aluminates: _____

Free Lime: _____

Periclase: _____

Pores/Grindability: _____

Point Count: C₃S: _____ % C₂S: _____ % C₃A: _____ % C₄AF: _____ % F.L.: _____ %

Periclase: _____ % Pores: _____ % Total Points: _____

Comments: _____

Thin Section:

Alite Size: _____ Birefringence: _____ Morphology: _____

Belite Size: _____ Color: _____

Comments: _____

Results From: _____ Address: _____

Date: _____

Sample Identification Number: _____
Sent by: _____
Date: _____

I POLISHED SECTION METHOD:

Alite

Average Size: _____ μm Number of crystals measured _____

Crystal Edge Condition: _____ Morphology: _____
(*belite fringing, sharp, ...*) (*euhedral, anhedral, subhedral, ...*)

Belite

Average Size: _____ μm Number of crystals measured _____

Lamelle condition: _____ Shape: _____
(*multidirectional, parallel, "ragged", ...*) (*round, acicular, ...*)

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: _____ Aluminate/Ferrite Ratio: _____
(*bright, moderate, dull*)

Alkali Aluminate Amount: _____ %

Alkali Sulfate

Amount: _____ %

Porosity

Amount: _____ %

I POLISHED SECTION METHOD (cont.)

Point Count:

C₃S: _____ % C₂S: _____ % C₃A: _____ % C₄AF: _____ %

Free Lime: _____ % Periclase: _____ % Pores: _____ %

Total Points Counted: _____

Comments: _____

II THIN SECTION:

Alite

Average Size: _____ μm Birefringence: _____ Morphology: _____
(*euhedral, anhedral, subhedral, ...*)

Belite

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

Comments: _____

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: _____

Analysis by : _____ Address: _____

Date: _____