

Potential Solutions for Mercury Control in the Cement Industry

Hot Topic Presentation

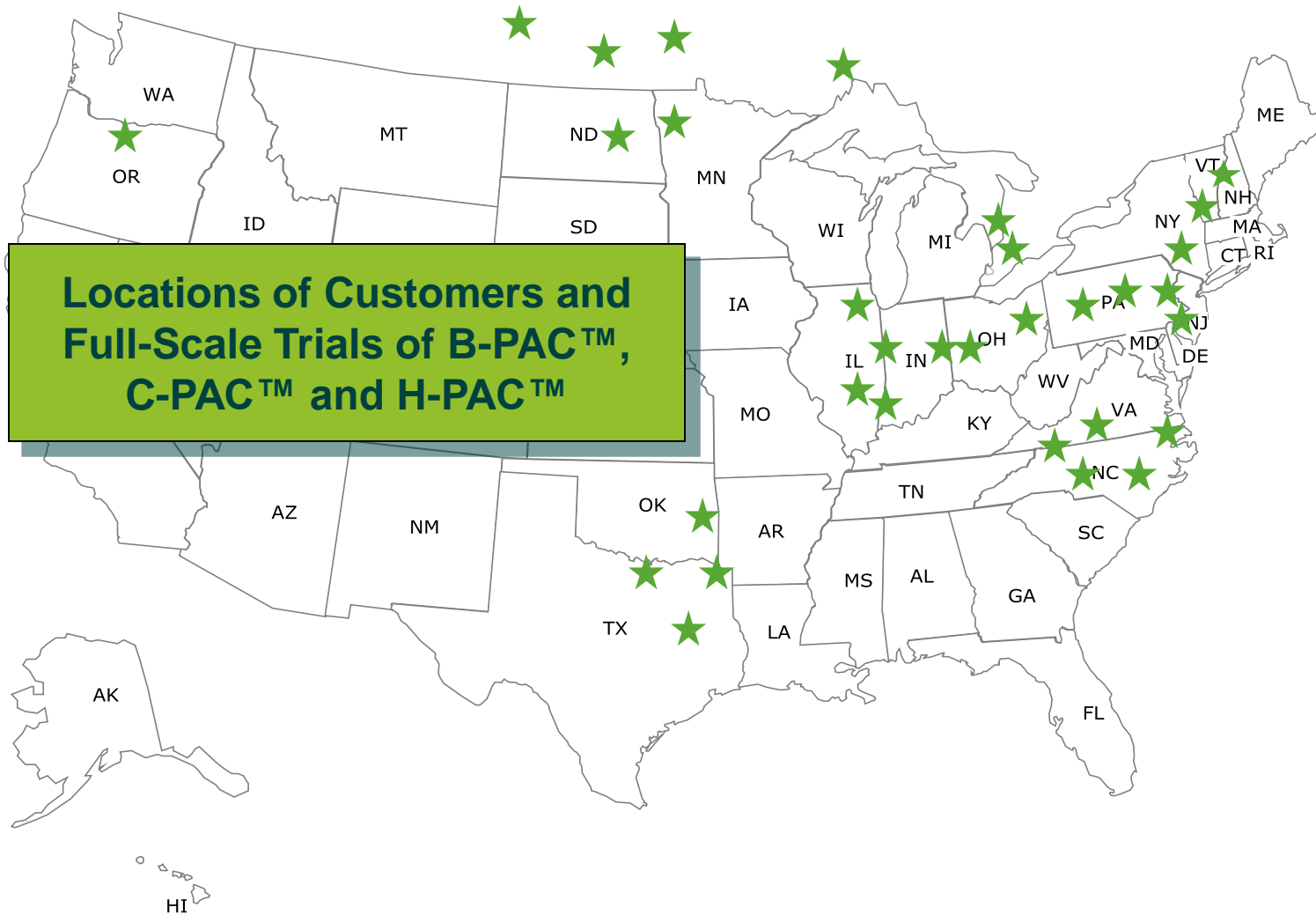
March 12, 2010

 ALBEMARLE® | Sorbent Technologies





Update: Over 50 Trials or Customers



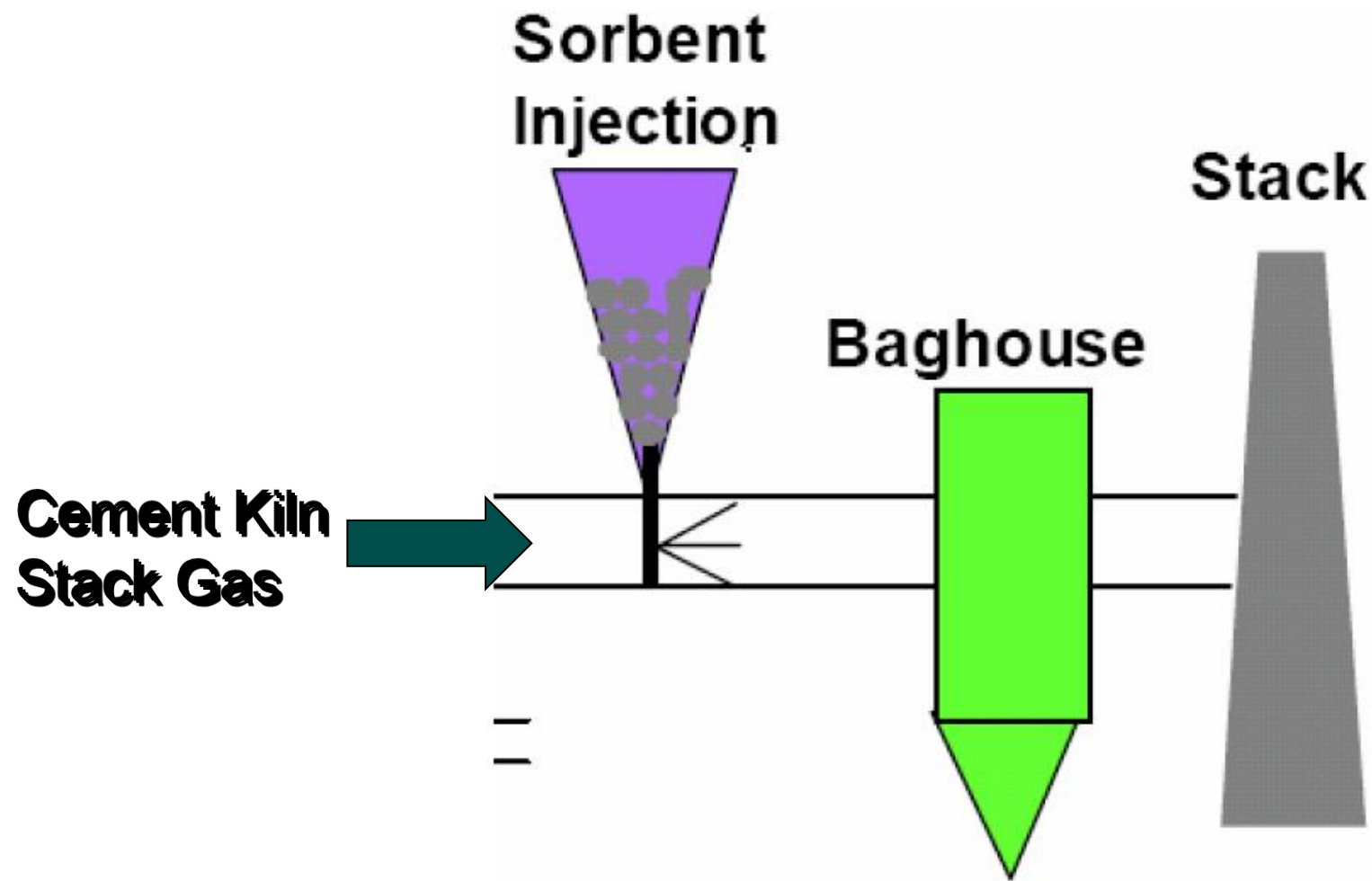


Mercury Control in Cement Kilns

1. **Shutdown**
2. **Use lower mercury raw materials**
3. **Add-on particulate control and sorbent injection equipment – works but costly**
4. **Add only a sorbent injection system and inject C-PAC a concrete-friendly™ mercury sorbent - to be demonstrated but much less costly**



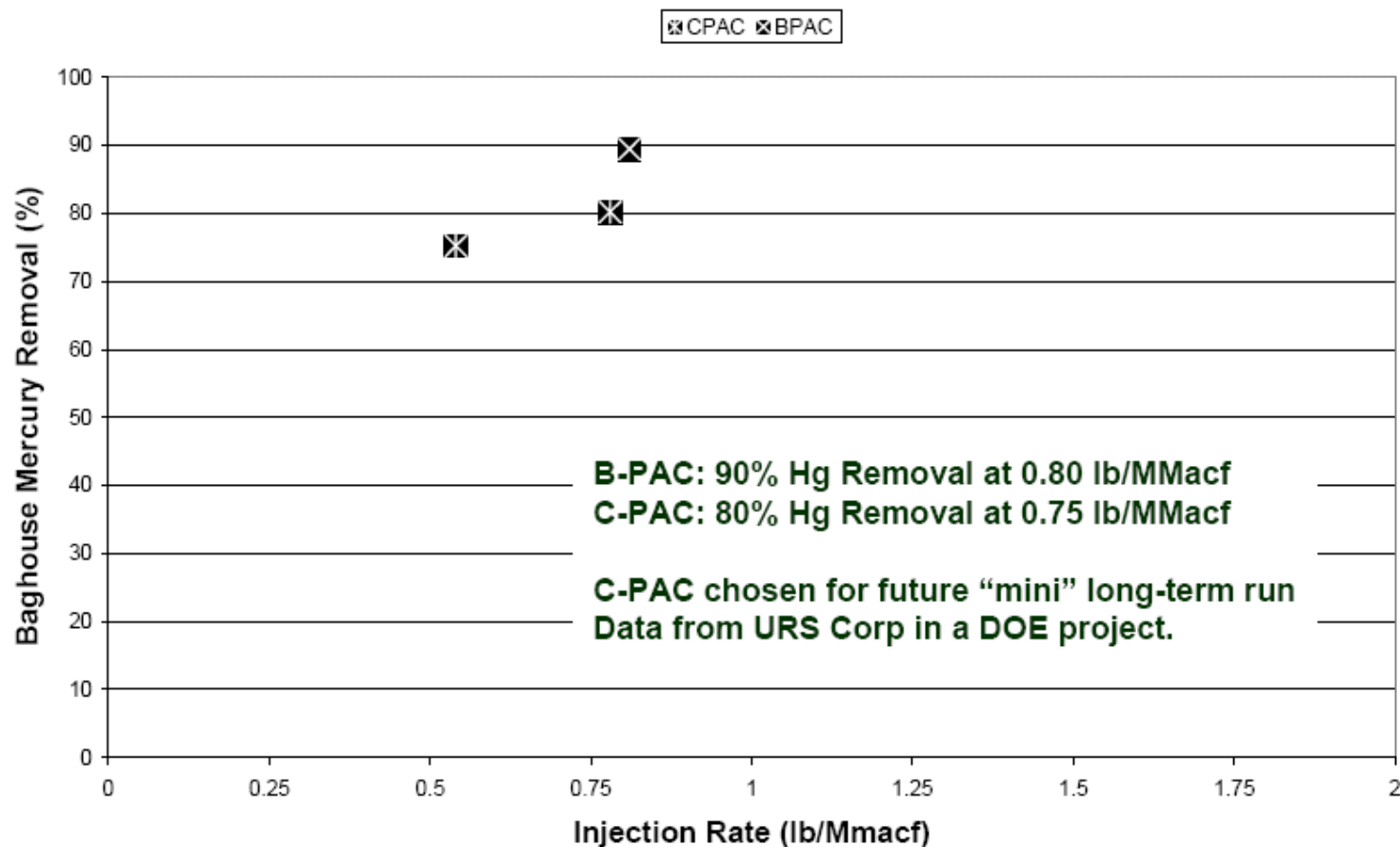
Add-On Baghouses and ACI Systems





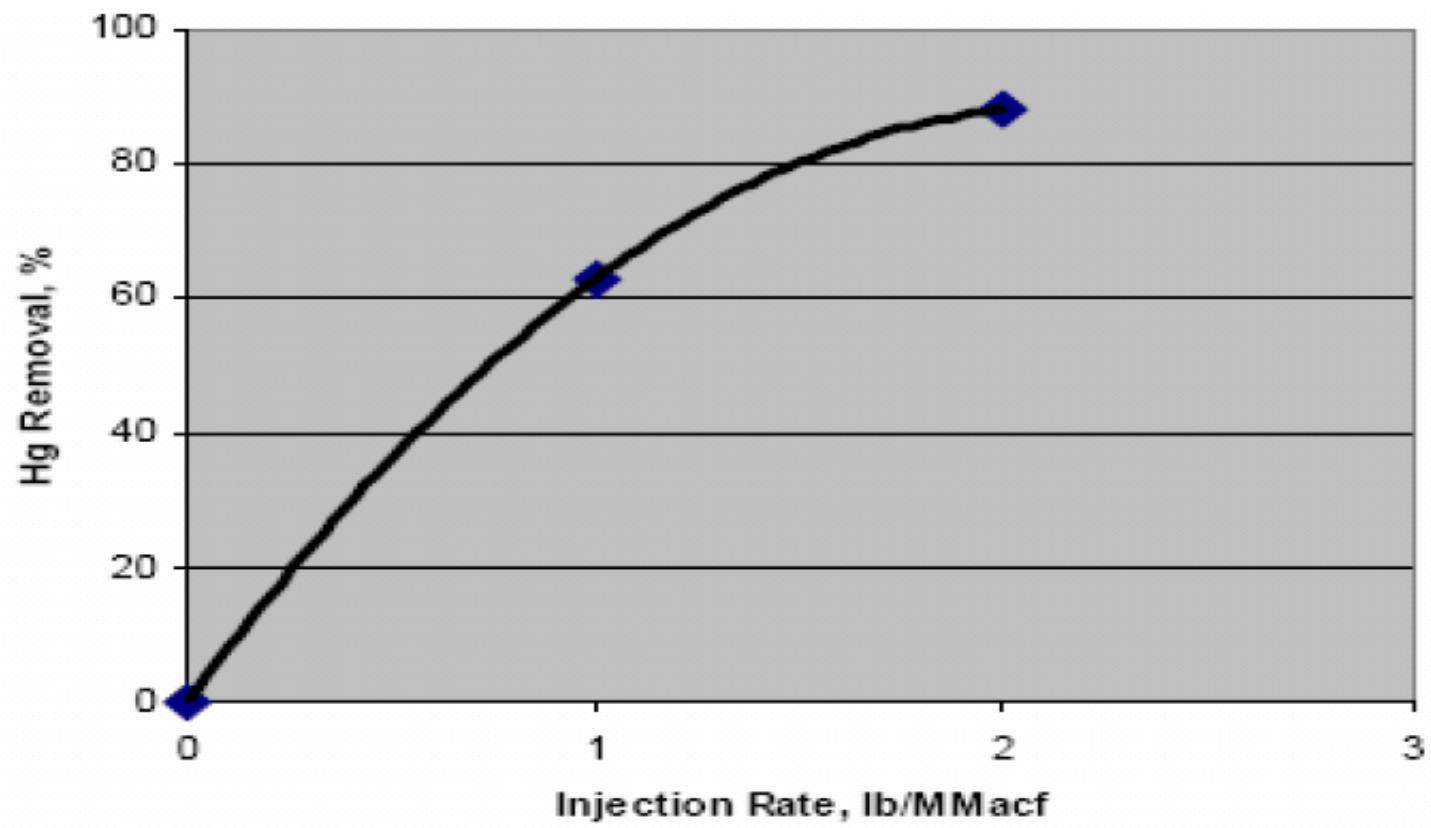
Mercury Capture in a Baghouse

Summary of Sorbent Mercury Removal Performance Across
Unit 3 Baghouse at Harrington Station





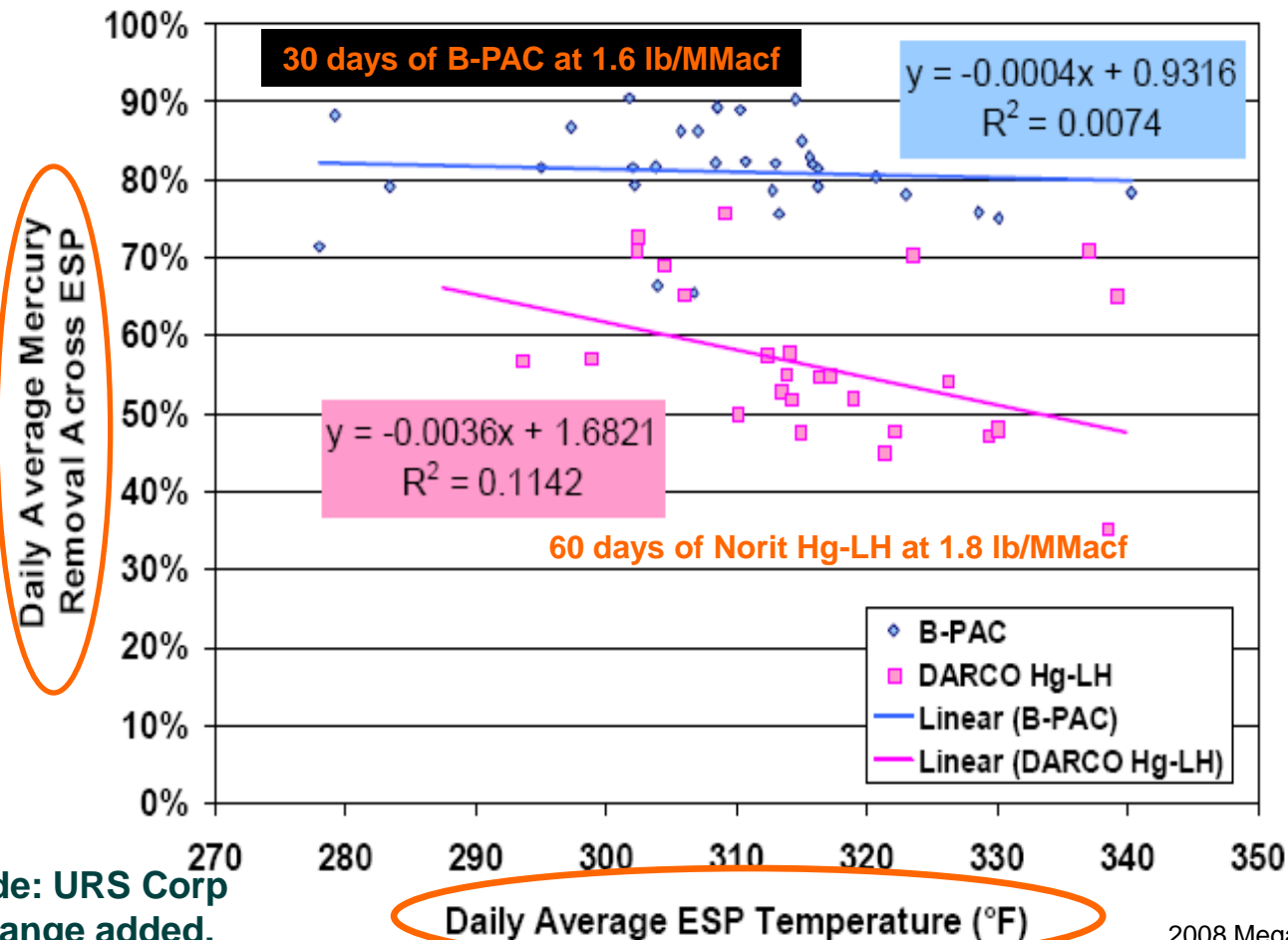
High Mercury Level Application



Plant with high and highly variable Hg Emissions



Relative Performance

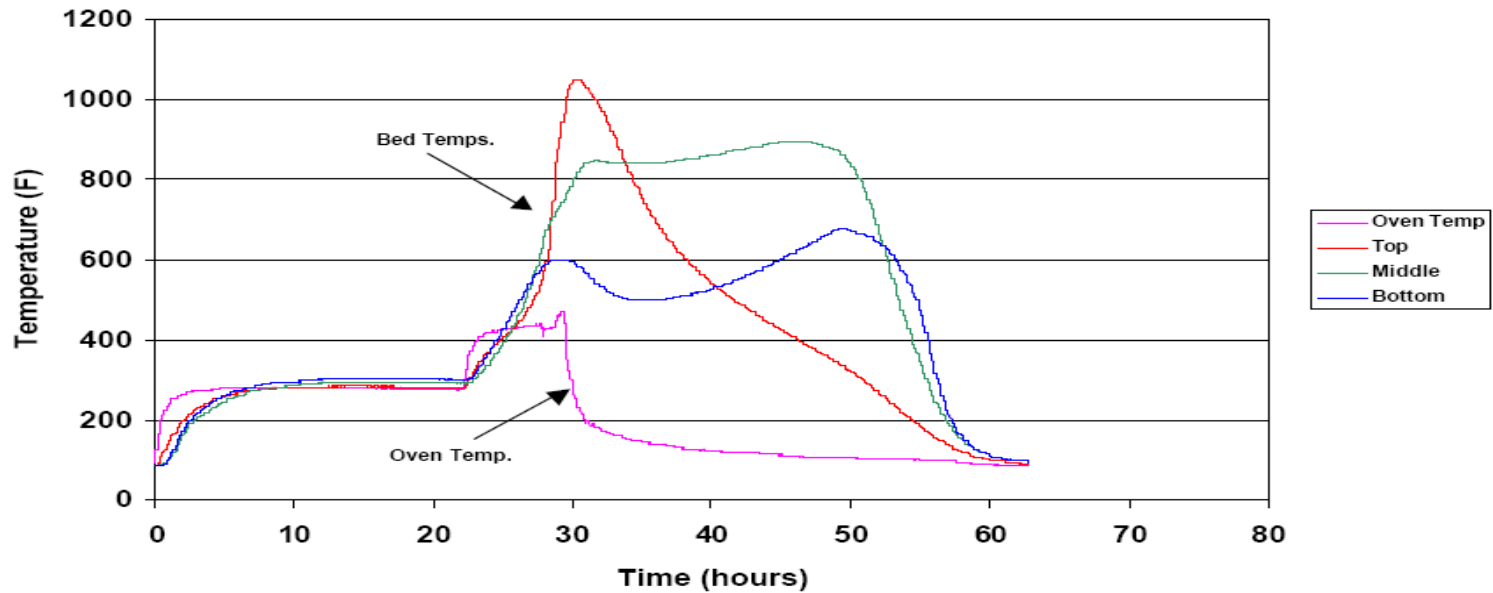


Slide: URS Corp
Orange added.



Problem with Add-On Baghouses

Frank-Kamenetskii Test - 6" Cube
1500 g DARCO Hg/Ash, 1.5 lb/MMacf
LOI 26.5%



Bustard, J., 2006 Mega Symposium



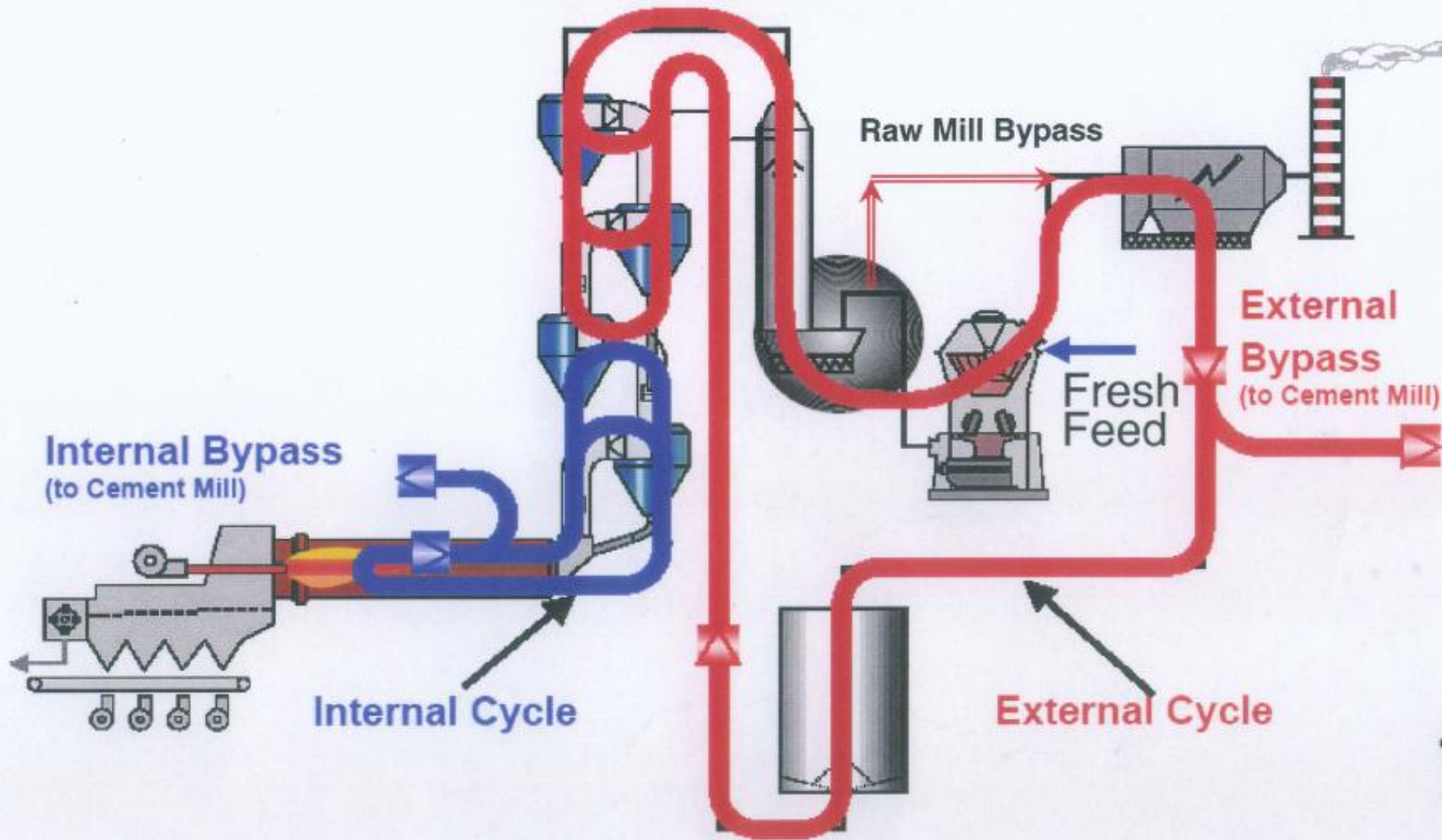
In-Process Mercury Control Concept

- Utilize the existing baghouse
- Add only a sorbent injection system (low capital cost)
- Use C-PAC™ a concrete-friendly™ sorbent
- Inject only at selected times
- Direct CKD collected during injection to cement mill rather than recycle to the cement kiln



In-Process Mercury Control

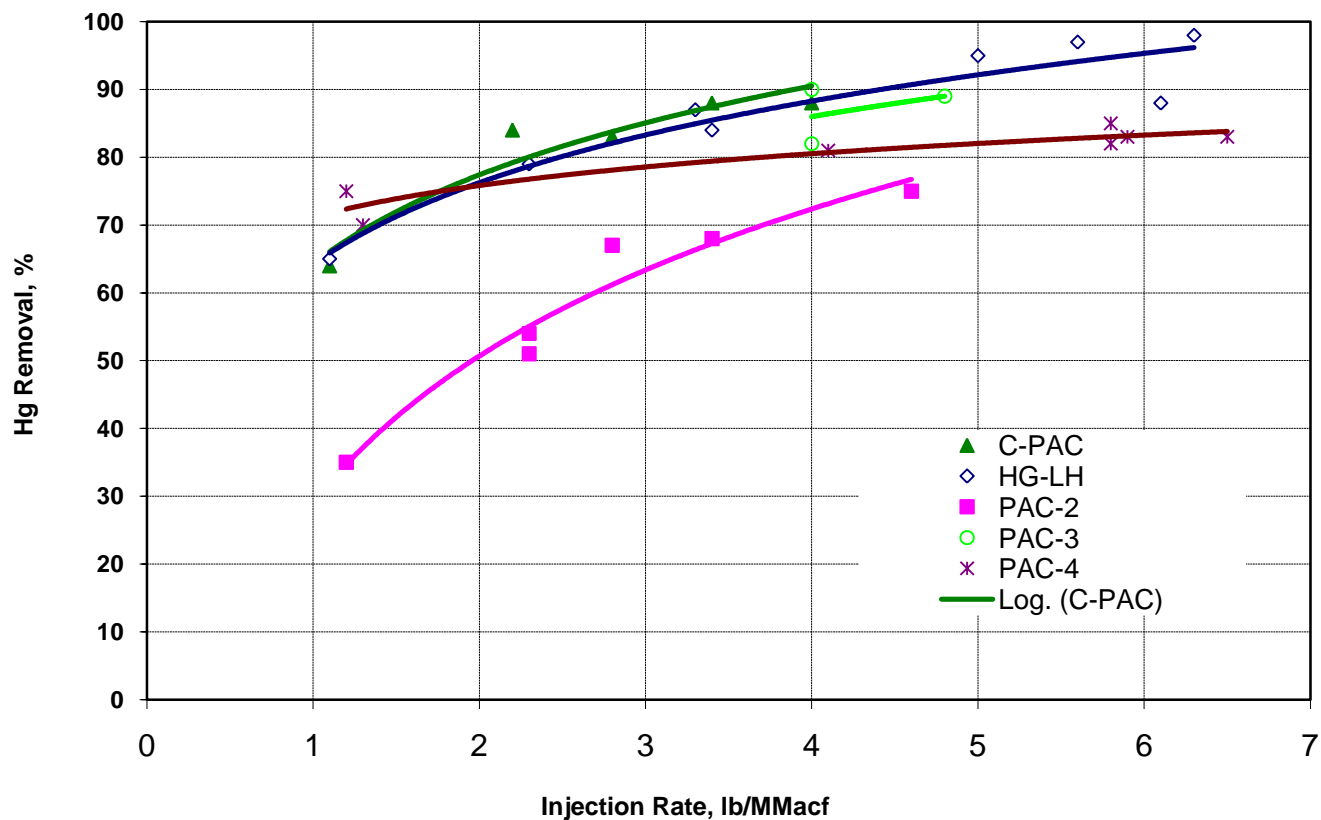
Circulation Phenomena





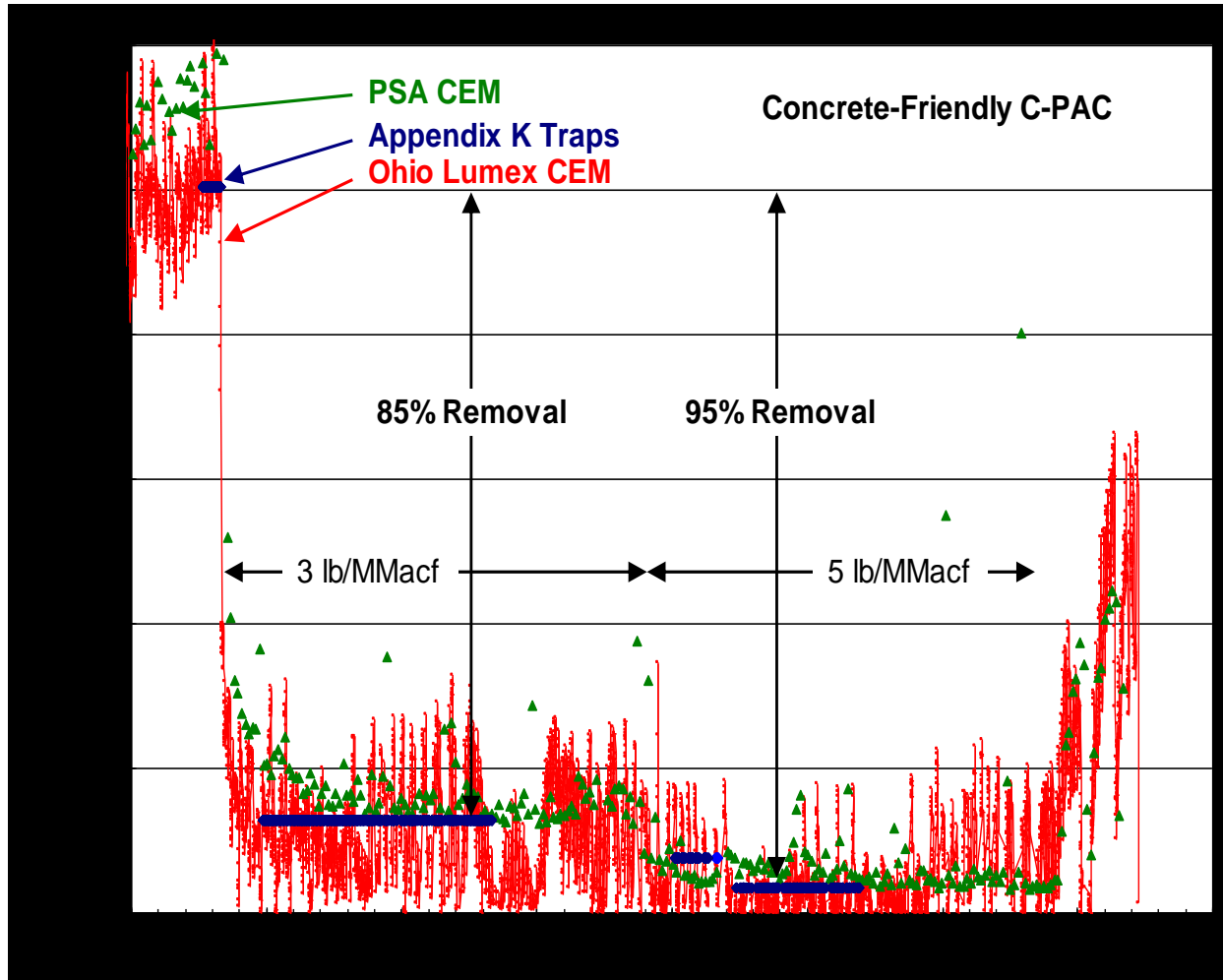
C-PAC™ with PRB & ESP

Mercury Removal vs. Injection Rate
at Boardman



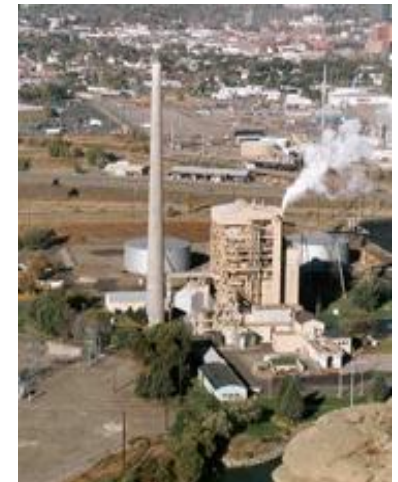


C-PAC™ with PRB & ESP



PAC Injection before the APH

Coal Specs: Hg ~0.08 ppm, 0.3% sulfur, 30% moisture, less than 5% ash

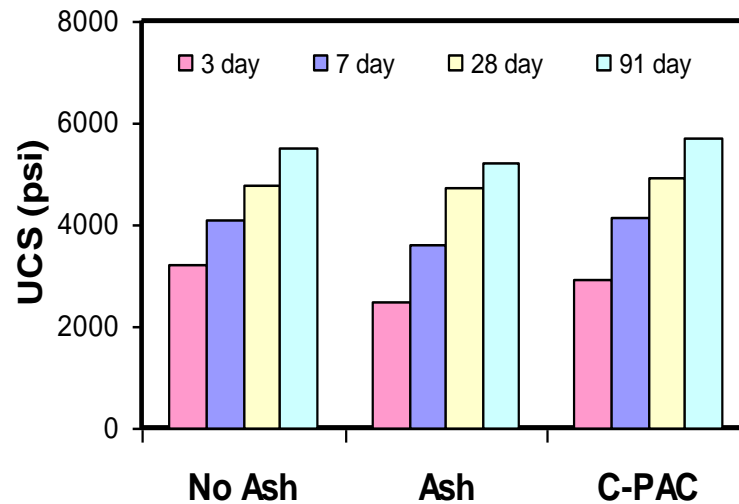


Plant accepted & sold all fly ash as concrete-friendly

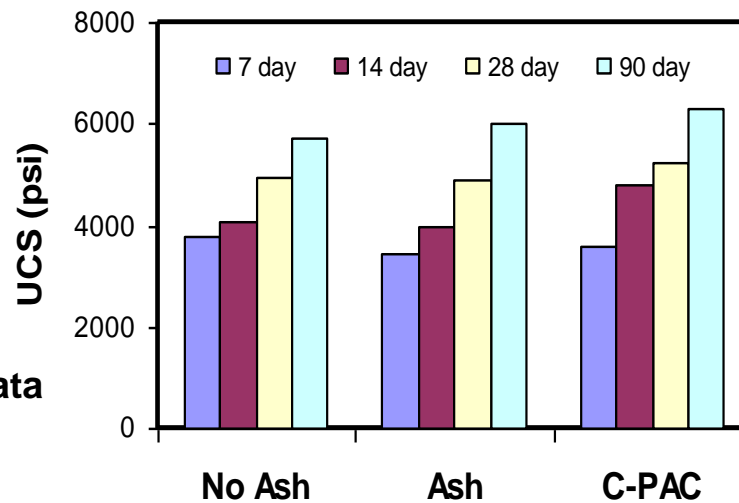


Still High Compressive Strength

Headwaters data



Sorbent Technologies data





In-Process Hg Control Concept

- Inject only when Hg emission is the highest
- Separate the CKD generated during that time
- Use concrete-friendly™ mercury sorbent to avoid any impact on the cementitious properties of the CKD
- Direct the separated CKD to the cement grinding mill
- The mercury won't leach since it has reacted on the mercury sorbent
- The injection length is only long enough to reduce the mercury emission below the MACT standard.
- We can test it for you – Maybe it will be your Hg solution



Patent Pending

Patent pending on carbon-based concrete-friendly™ mercury sorbents

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
29 May 2008 (29.05.2008)

PCT

(10) International Publication Number
WO 2008/064360 A2

(51) International Patent Classification:
A61M 5/155 (2006.01)

(74) Agents: CUNNIFF, John J. et al.; One GOJO Plaza, Suite 300, Akron, OH 44311-1076 (US).

(21) International Application Number:
PCT/US2007/085474

(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, SV, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(22) International Filing Date:
23 November 2007 (23.11.2007)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
60/860,563 22 November 2006 (22.11.2006) US

(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, LV, MC, MT, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

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Published:

— without international search report and to be republished upon receipt of that report





Questions?

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