

REINHOLD ENVIRONMENTAL Ltd.



2012 NO_x-Combustion Round Table & Expo Presentation

February 13-14, 2012, in Columbus, OH / Hosted by AEP

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Panel I: Challenges of Designing and Operating PRB-Fired SCR Units



Johnson Matthey
Catalysts



REINHOLD ENVIRONMENTAL LTD.

2012 NO_x-Combustion Round Table
Columbus, OH
February 13, 2012

Ken Jeffers, Chairman



Introduction of Panelists



Jim Chaney – Environmental Controls Specialist
Ameren Generation, E D Edwards



Tony Favale, PE – Director, SCR Services
Hitachi Power Systems America



Betty Hansen – Project Manager
Babcock & Wilcox



Jeremy Freeman – Manager, Engineering Services
Cormetech



Ed Healy – Conceptual Design Manager
Southern Company



Bill Medeiros – Principal Proposal Engineer
Babcock Power



PRB-fired Units with SCR – 12 years of Operating Experience



- First 100% PRB Unit with SCR – New Madrid 2 (2000)
- ~50 units operating by 2011, ~12 units to start 2012 – 2014
- General Consensus → SCR operation is challenging with PRB
- Fuel and fly ash chemistry often lead to fast catalyst deactivation
- High Ca content in ash →
 - Plugging/fouling catalyst pores
 - Combining with SO_3 to form Gypsum – surface masking
 - Alkaline ash sticky – easy to buildup, plug catalyst flow channels
 - Ash + moisture = sets-up like plaster, hard to remove from catalyst surface
- Phosphorus poisoning – severity could be related to combustion methods and/or interaction with SO_3 .



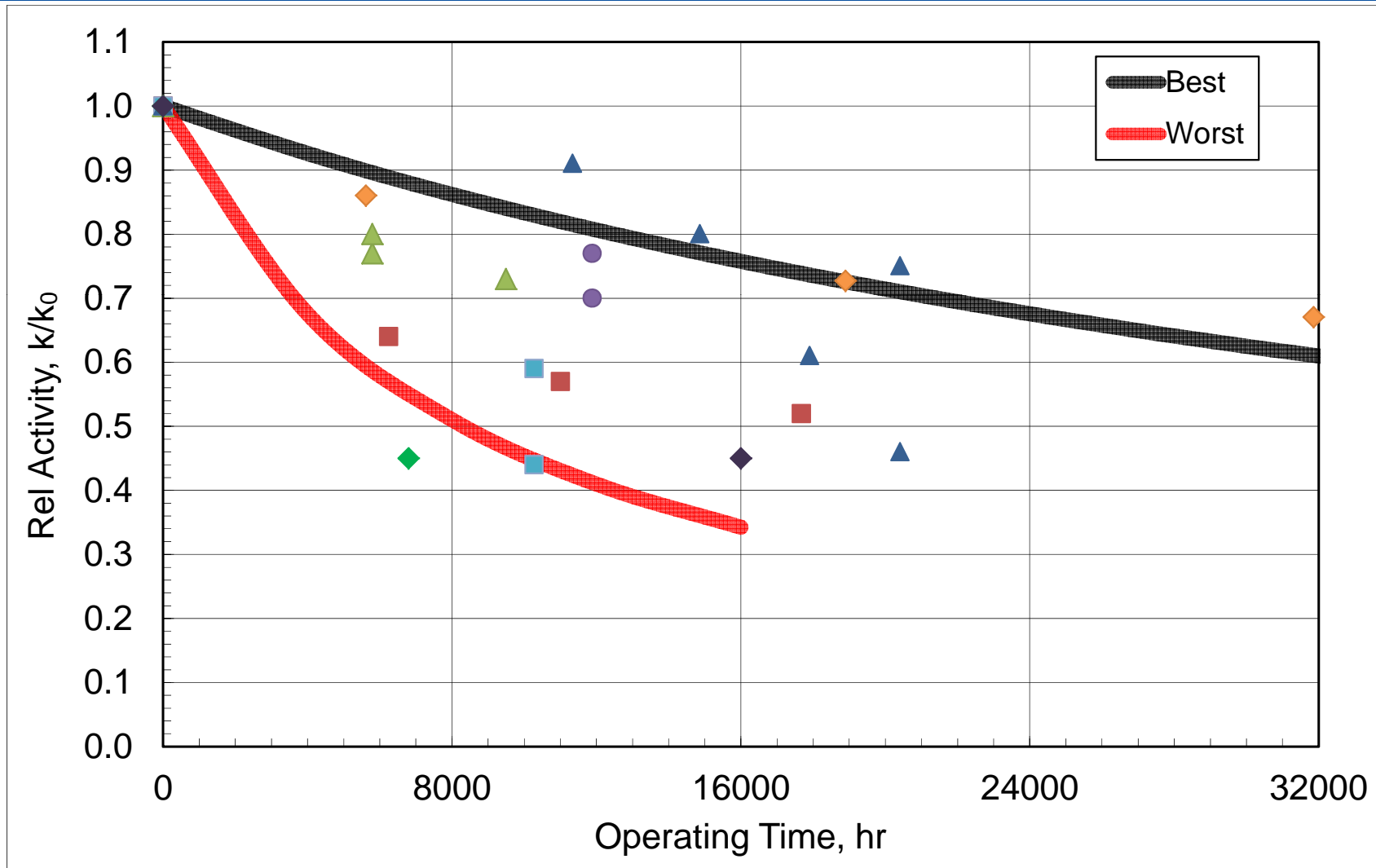
Coal Comparison



Parameter	Eastern Bit	Western Bit	PRB	TX Lignite
HHV, BTU/lb	13000	10000	8500	7000
Moisture, wt%	6	20	30	32
Ash, wt%	10	5	5	13
Chlorine, wt%	0.1	<0.01	0.01	0.01
Sulfur, wt%	1.5-3.0	1.0	0.5	1.0
Trace As, mg/kg	5-50	1	1	1
Ash Analysis				
CaO, wt%	1-5	8.0	25	13
Fe ₂ O ₃ , wt%	15	6.0	6.0	4.5
K ₂ O, wt%	2.0	0.6	0.3	0.9
Na ₂ O, wt%	0.5	0.6	1.9	0.5
P ₂ O ₅ , wt%	0.5	0.2	1.0	0.4



Catalyst Deactivation for 100% PRB-fired Units – Wide Variation in Performance



SCR Reactor and Catalyst Design



- It's all been done . . .
- Reactor layers: 2+1, 2+2, 3+1
- With and without SCR by-pass
- Flue gas temperatures, 650 – 800 °F
- NO_x reduction, 36 – 93%
- Catalyst types – Plate, Honeycomb, Corrugated
- Pitch Selection
 - Plate: 5.5 – 7.1 mm
 - Honeycomb: 6.9 – 9.3 mm
- Both Sonic horns and Soot-blowers used for cleaning



Q & A Session

