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Lab Weekly Reports

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## Weekly Report

C. Lin &amp; A. Keita

(1), The following petrographic data were

obtained:

<u>Coal</u>	<u>Fluidity</u> dd.p.m.	<u>Mean Max.</u> <u>Refl. %</u>	<u>Others</u>
Jewell (1/20/98, 12661)	4,550	1.35	Fresh
Jewell (1/20/98, 144248)	3,628	1.32	Fresh
Smokey River (1/23/98, Pite/c)	4.8	—	—
Smokey River (1/27/98, Pite)	3.2	1.63	Fresh
Wells (1/15/98, 349571)	47,860	0.94	Fresh
Wells (1/15/98, 810441)	54,832	0.94	Fresh
Wells (1/15/98, 810999)	57,206	0.93	Fresh
Pet-coke (L.S.) (1/22/98, Truck)	aggregatable	2.52	With some coal contamination; some of them were oxidized

(1) (Continued)

<u>Coal</u>	<u>Fluidity</u> d.t.p.m.	<u>Mean Max.</u> <u>Ref. %</u>	<u>Others</u>
Petrocoke (L-S) (1/29/98, Truck)	1.8	2.16	① Fresh ② With lots of oil soluble amorphous phase.

(2) A 100-lb Larry Car Coal sample (1/8/98) was shipped to UEC for Stho-test after checking its fluidity.

<u>Fluidity</u> d.t.p.m.	<u>Sox-heated Oven</u> <u>Test Results</u>
3738	-12.2%

(3) A hot metal cost evaluation was performed in order to compare the use of Meadow River instead of Jewell Coal

(4). The followings are the newest information on our furnace coke reactivities & CSRs:

(a) Latest Reactivities & CSRs:

<u>Date</u>	<u>Reactivity, %</u>	<u>CSR, %</u>
1/6/98	26.3	60.3
1/23/98	24.0	61.9
2/2/98	27.1	58.5

So, the problem did not disappear by itself.

(b) Our Lab's Results vs UEC's

Results:

<u>Date</u>	<u>Reactivity, %</u>		<u>CSR, %</u>	
	<u>ACME</u>	<u>UEC</u>	<u>ACME</u>	<u>UEC</u>
11/6/97	23.8	23.3	67.9	63.8
11/26/97	28.0	26.2	58.8	56.9

The experimental error of reactivity is  $\pm 2\%$  while the experimental

error on CSR is  $\pm 3\%$ . That also means that our equipment had no problem.

(c) There was no visual contamination on any coal. For example, 0.5% by weight lime stone contamination is enough to affect coke reactivity.

(d). Coke Ash Softening Temperature also indicated the problem.

<u>Date</u>	<u>Ash Softening Temperature</u>
11/6/97	2,493°F
11/26/97	2,437°F

The ingredient in ash to cause lower ash softening temperature will also make coke more reactive. Actual blend's ash softening temperature usually is less than its theoretical value due to the contamination.

Rock's or mud's softening temperature is much less than that of Coal ash.

(e). Jewell or Wells Coals are normal:

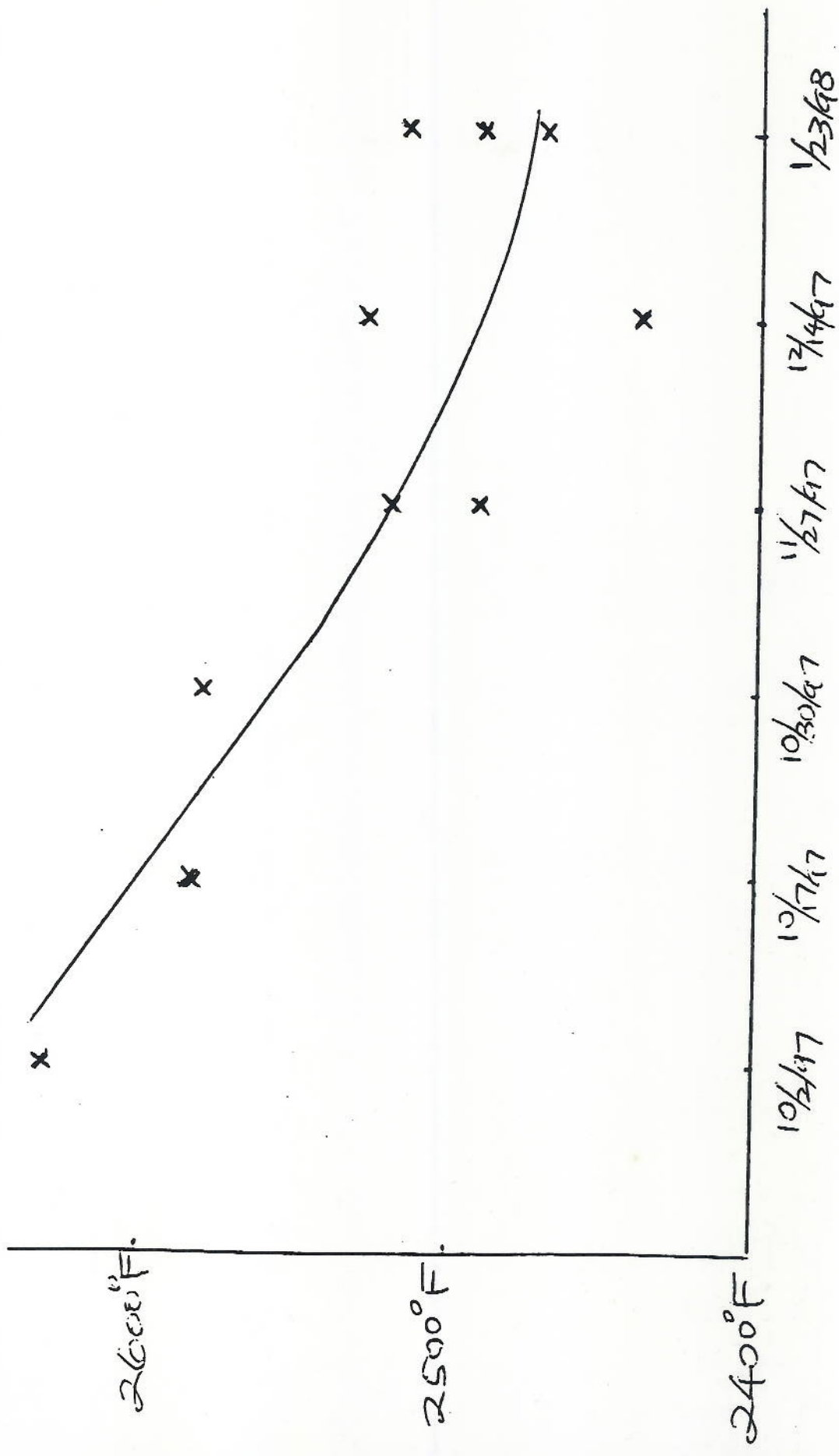
<u>Coal</u>	<u>Ash Softening Temperature, °F</u>
Jewell (11/11/97, 9202)	2,610
Jewell (11/26/97, 133100)	2,638
Jewell (11/26/97, 5006)	2,581
Jewell (11/2/97, 62173)	2,639
Jewell (10/17/97, 3735)	2,588
Wells (1/15/97, 349571)	2,700 <sup>+</sup>
Wells (1/15/97, 810441)	2,700 <sup>+</sup>
Wells (1/15/97, 810999)	2,669

Wells 2,697  
 (1/3/98, 810463)

Wells 2700<sup>+</sup>  
 (1/3/98, 831125)

- (f) Micro structure of Furnace coke + Crucible coke (Made from Smokey River Coal) were normal.
- (g) Smokey River Ash Softening Temperatures were abnormal (See chart).
- (h) A new coal Blend with 20% Elkview (Another Western Canadian Coal) was proposed in order to increase CSR.
- (i) Smokey River Broker was contacted.  
 A 10,000 ton Unit train good Smokey River Coal is under the plan.

# Ash Softening Temperature of Smoky River Coal





## Weekly Report C. Lin &amp; A. Keita

(1) The following petrographic data were

obtained:

<u>Coal</u>	<u>Fluidity</u> d.d.p.m.	<u>Mean Max.</u> <u>Ref. %</u>	<u>Others</u>
Jewell (4/29/98, 131667)	1,451	1.36	Fresh
Jewell (4/29/98, 11684)	1,270	1.46	Fresh
Jewell (4/17/98, 320699)	—	1.34	—
Sun-Oil Pet-coke (4/30/98, KCBX P.1)	0.2	2.70	Fresh
Aimcor Pet-coke (4/20/98, 522)	—	2.72	—
Smokey River (4/27/98, Boat Sample #1)	3.5	1.56	Fresh
Smokey River (4/27/98, Boat Sample #2)	4.9	1.61	Fresh
Wells (5/4/98, 329228)	33,563	0.93	Fresh

(1) (Continued)

<u>Coal</u>	<u>Fluidity</u> d.d.p.m.	<u>Mean Max.</u> <u>Refl. %</u>	<u>Others</u>
Wells (5/4/98, 86423)	39,960	0.92	Fresh

(2). A 100-lb Larry Can Coal Sample (5/7/98) was shipped to UEC for Sote-Heated Oven Test after checking its fluidity.

<u>Fluidity</u> d.d.p.m.	<u>Sote-Heated Oven</u> <u>Test Result</u>
8,289	-8.1%

(3). Two Hot Metal Costs were evaluated:

(a). Using Oak Grove L.V. Coal to boost-up on coke's CSR.

(b). Obtaining a bidding price of the Odd pet-coke pile on KCBX at the present time.

(4). Furnace coke (5/4/98) were checked:

<u>Reactivity</u>	<u>Coke Strength After Reaction</u>
26.6%	60.0%

Coal blend was

Smokey River	20%
Jewell	25%
Wells	42%
Pet.-coke	9%
AcME Pre-mix	4%

(5). A crucible coke were made from 100% Oak Grove Coal. Coke microstructure told us (a). it was more like U.S. Coal than Western Canadian Coal (b). it looked more like a U.S. M.V. Coal rather than a L.V. Coal. That may explain why it shrinks during coking.

V. Beaucaire  
P. Egbers  
J. Garzella  
J. Johnson  
K. Leonard  
R. O'Hearn

# Weekly Report C. Lin & A. Keita

(1). The following petrographic data were

obtained:

<u>Coal</u>	<u>Fluidity</u> d.p.m.	<u>Mean Max.</u> <u>Refl. %</u>	<u>Others</u>
Jewell (11/24/97, 1175)	1,801	1.39	Fresh
Jewell (11/26/97, 116823)	1,896	1.41	Fresh
Jewell (11/30/97, 7042)	1,470	1.38	Fresh
Jewell (11/30/97, 13838)	2,581	1.38	Fresh
Jewell (11/27/97, 8932)	4,405	1.37	Fresh
Jewell (11/26/97, 5006)	1,422	1.42	Fresh
Jewell (11/27/97, 33100)	4,811	1.35	Fresh
Jewell (11/27/97, 2579)	1,831	1.38	Fresh

11) (Continued)

<u>Coal</u>	<u>Fluidity</u> d.d.p.m.	<u>Mean Max.</u> <u>Refl. %</u>	<u>Others</u>
Jewell (11/26/97, 6834)	3,835	1.36	Fresh
Smokey River (11/27/97, Boat/N)	3.9	1.61	Fresh
Smokey River (11/27/97, Boat/S)	3.5	1.62	Fresh
Wells (11/21/97, 808524)	59,930	0.92	Fresh
Wells (11/21/97, 811145)	64,227	0.92	Fresh
Wells (11/25/97, 804402)	50,820	0.93	<ul style="list-style-type: none"> <li>① Slightly oxidized</li> <li>② Trace of Pet-coke</li> </ul> maybe due to multi-handling.
Aimcor Pet-coke (11/24/97, 39034)	0.3	2.70	Fresh W/o Contamination
Aimcor Pet-coke (11/24/97, 3154)	0.2	2.56	Fresh W/o Contamination
Aimcor Pet-coke (11/24/97, 7016)	0.2	2.62	Fresh W/o Contamination

(1) (continued)

<u>Coal</u>	<u>Fluidity</u> d.d.p.m.	<u>Mean Max.</u> <u>Refl. %</u>	<u>Others</u>
Aimcor Pet-coke (11/30/97, 9202)	0.2	2.66	Fresh w/o Contamination
Larry Can (12/2/97)	—	—	Fresh
Pre-Mix (12/2/97, Mixer Bin)	—	—	Fresh
Beemsterboer Pre-Mix (12/3/97)	0.2	2.64	<ul style="list-style-type: none"> <li>① 10% Coal</li> <li>② 10% Breeze</li> <li>③ 80% Pet-coke</li> <li>④ Lots of Mineral Matter</li> </ul> Fresh

(2) The results of Smokey River's Ash Softening Temperatures are as follows,

<u>Sample Date</u>	<u>Ash Softening Temperature</u>
11/27/97 (Boat/S)	2491°F
11/27/97 (Boat/N)	2527°F

Distribution List:

- V. Beaucaire
- J. DiMauro
- P. Egbers
- J. Garzella
- J. Johnson
- R. O'Hearn

Week of 9/2, 9/9, & 9/16/96

# Weekly Report c. Lin & A. Keita

(1). The following petrographic data were

obtained:	Fluidity	Mega Max. Refl. %	Others
<u>Coal</u>	<u>d.d.p.m.</u>		
Eagle Nest (8/28/96, Pile/Comp.)	67,862	0.97	Fresh
Eagle Nest (9/5/96, B- 3715)	68,318	0.98	Fresh
Eagle Nest (9/5/96, B- 3936)	50,012	1.00	Fresh
Eagle Nest (9/5/96, B- 3701)	48,161	0.98	Fresh
Eagle Nest (9/5/96, B- 3168)	50,521	1.01	Fresh
Eagle Nest (9/9/96, B- 3890)	55,663	0.98	Fresh
Eagle Nest (9/9/96, B- 3933)	56,494	1.01	Fresh
Jewell (9/16/96, 3949)	1,093	1.37	Fresh

(1) (Continued)

<u>Coal</u>	<u>Fluidity</u> d.d.p.m.	<u>Mean Max.</u> <u>Refl. %</u>	<u>Others</u>
Fire Creek (9/10/96, R- 386460)	2,121	1.12	Fresh
Fire Creek (9/10/96, B- 386213)	3,632	1.08	Fresh Contaminated with Low-Refl. Coals
Ridgeland (9/16/96, Pile/ Comp.)	44	-	-
Smokey River (8/27/96, Pile/Comp.)	1.0	1.66	Fresh
Smokey River (9/10/96, Truck)	1.8	-	-
Smokey River (9/16/96, Truck)	1.8	-	-
Regina Pet-coke (9/13/96, Truck)	0.1	-	-
Regina Pet-coke (9/18/96, Truck)	0.2	-	-
White Deer (9/16/96, B- 3066)	43,600	0.94	Fresh



(1). (Continued)

<u>Coal</u>	<u>Fluidity</u> d.d.p.m.	<u>Mean Max.</u> <u>Refr. %</u>	<u>Others</u>
White Deer (9/16/96, B- 832)	41,915	0.96	Fresh
White Deer (8/26/96, Pile/ Comp.)	—	0.95	—
Larry Car (8/29/96)	2,691	—	—
Larry Car (9/3/96)	1,301	—	—
Larry Car (9/4/96)	1,241	—	—
Larry Car (9/ /96)	1,851	—	—
Larry Car (9/11/96)	2,274	—	—
Larry Car (9/12/96)	1,705	—	—
Larry Car (9/13/96)	1,842	—	—
Larry Car (9/16/96)	2,711	—	—

(2). Three 100-lb Larry Can Coal Samples (9/5/96, 9/10/96, & 9/16/96) were collected and shipped, to UEC for SFO-Tests, after checking their fluidities:

	<u>Fluidity</u> d.p.m.	<u>Sole-Heated Ov.</u> <u>Test Results, %</u>	<u>Comment</u>
9/5/96	1,638	-5.6%	Not enough.
9/10/96	1,704	-7.7%	Still not enough.
9/19/96	1,855	-	-

That's why we have had hard pushes for a period of time. Usually, we need 8 → 10% shrinkage for easy push.

(3). Two pet-cokes are under evaluation at this moment.

	<u>Fluidity</u> d.p.m.	<u>Mean Max.</u> <u>Refl. %</u>
Amoco (Received 9/18/96)	0.2	-
Mc Cartin (Received 9/18/96)	0.2	-

Sample also sent to Chem. Lab. for proximate.

(4) Two furnace cokes (9/4/96 & 9/16/96) were checked for their CSR & Reactivities.

	<u>Reactivity%</u>	<u>Coke Strength After Reaction, %</u>	<u>Comment</u>
9/4/96	23.7	66.6	O.K.
9/16/96	24.9	59.8	Doesn't seem right. Re-tes needed.

Coal blends were

	<u>9/4/96</u>	<u>9/16/96</u>
Jewell	15%	25%
Smokey River	20%	20%
Ammonate	8%	-
Eagle Nest	20%	21%
White Deer	20%	21%
Fire Creek	8%	4%
Pet-coke	9%	9%

(5) Attended P.C. Classes.

(6) We continued to send individual coal to UEC for Sole-Heated Oven test:

<u>Coal</u>	<u>SFO-Test Result</u>	<u>Vendor's Promised "Typical"</u>	<u>Comment</u>
Ridpeland (9/6/96, Pile/comp)	-1.8%	$\pm 0\%$	O.K.