12-3-91
12.3.8 v.6

ASH GROVE CEMENT WEST, INC.

Inter-Office Memorandum

Date December 3, 1991

To Nate Fernow

From Eric Nussle Eric

Copies to HANS STEUCH
Jim POST

Subject Tacoma Steam Plant

RAW MATERIAL ANALYSIS, SEATTLE LABORATORY

SEATTLE SAMPLE #: 201-91 DATE RECEIVED: 11/25/91

RECEIVED FROM: Mark Gamble DATE SAMPLED: Unknown

NOTE: From Tacoma P.U.D.

COMPOUNDS AS ANALYZED	%
Silicon Dioxide, SiO_2	47.47
Aluminum Oxide, Al_2O_3	20.04
Iron Oxide, Fe_2O_3	3.46
Calcium Oxide, CaO	17.09
Magnesium Oxide, MgO	2.55
Sodium Oxide, Na_2O	2.75
Potassium Oxide, K_2O	1.70
Loss on Ignition	3.28
Total Sulfur as SO_3	3.46

Supply: ~ 30-60 tons/day

SIEVE ANALYSIS

Mesh	% Passing
50	99.7
100	91.1
200	82.3

USEPA SF
1261782

1T

SEATTLE

TYPE II MIX									GAS FIRED	
DATE	12/10/91							TACOMA		
SAMPLE IDENT #	LIMESTONE	SUPERIOR	PAC. CST	L-BAR	KAN KAT	Fe ORE	CASTL RK	BOTTOM	FUEL	
SOURCE OF --	CaO/MgO	SIO2	Al2O3	Al2O3	Al2O3	Fe2O3	Al2O3	ASH	ASH	CLINKER
MOISTURE FREE COST	$6.09	$14.58	$8.70	$9.78	$10.75	$10.20	$18.95	($5.43)		$10.904
										Type II Cement
Fraction (raw/clk ton)	1.2620	0.1150	0.1630	0.0000	0.0000	0.0120	0.0000	0.0000	0.0000	1.5520
Che ical Analysis										
SI02	2.38	95.00	54.00	66.90	41.00	8.00	35.00	47.50	53.60	22.83
Al2O3	0.88	1.20	18.40	16.80	32.00	3.00	41.00	20.00	27.20	4.28
Fe2O3	0.58	2.20	6.40	5.00	12.00	88.00	1.00	3.50	4.90	3.08
CaO	50.96	0.30	3.40	1.60	0.50	2.60	4.00	17.00	4.20	64.93
MgO	2.06	0.10	2.70	0.80	0.50	0.10	1.50	2.50	1.90	3.05
SO3	0.28	0.20	0.10	0.05	0.00	0.05	0.30	3.46	2.90	0.39
Loss	42.66	0.60	11.70	6.29	14.00	-3.30	16.50	3.28	0.00	0.20
Na2O	0.08	0.02	1.80	0.20	0.05	0.07	0.00	1.70	0.71	0.40
K2O	0.05	0.02	1.50	2.49	0.28	0.04	0.00	2.75	1.40	0.31
Total Alkali	0.11	0.03	2.79	1.84	0.23	0.10	0.00	3.51	1.63	0.60
TOTAL	99.93	99.64	100.00	100.13	100.33	98.56	99.30	101.69	96.81	99.48
Silica Ratio	1.63	27.94	2.18	3.07	0.93	0.09	0.83	2.02	1.67	3.10
A/F Ratio	1.52	0.55	2.88	3.36	2.67	0.03	41.00	5.71	5.55	1.39
Li e Sat. Factor	6.126	0.001	0.018	0.007	0.003	0.045	0.024	0.102	0.021	0.901
C3S	182.6	-732.0	-529.3	-621.9	-541.7	-196.2	-526.6	-431.2	-580.0	57.7
C2S	-131.0	824.6	554.1	661.0	526.2	171.0	497.6	461.4	591.2	21.9
C3A	1.4	-0.5	37.9	36.1	64.5	-140.9	107.0	47.1	63.8	6.1
C4AF	1.8	6.7	19.5	15.2	36.5	267.8	3.0	10.7	14.9	9.4
TONS/~~YEAR~~ DAY BASED ON: 2,200 TONS OF CLINKER	2,776	253	359	0	0	26	0	0		
MOISTURE AS RCVD.	1.5	4.0	8.0	8.0	7.0	2.0	5.0	8.0		
AS RECEIVED PRICES:	$6.00	$14.00	$8.00	$9.00	$10.00	$10.00	$18.00	($5.00)		
H2O CORRECTED TONS:	2,819	264	390	0	0	27	0	0		

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2T

SEATTLE

TYPE II MIX										GAS FIRED
DATE	12/10/91							TACOMA		
SAMPLE IDENT #	LIMESTONE	SUPERIOR	PAC. CST	L-BAR	KAN KAT	Fe ORE	CASTL RK	BOTTOM	FUEL	
SOURCE OF --	CaO/MgO	SIO2	Al2O3	Al2O3	Al2O3	Fe2O3	Al2O3	ASH	ASH	CLINKER
MOISTURE FREE COST	$6.09	$14.58	$8.70	$9.78	$10.75	$10.20	$18.95	($5.43)		$10.615
Fraction (raw/clk ton)	1.2550	0.1200	0.1370	0.0000	0.0000	0.0135	0.0000	0.0200	0.0000	1.5455
Che ical Analysis										
SiO2	2.38	95.00	54.00	66.90	41.00	8.00	35.00	47.50	53.60	22.84
Al2O3	0.88	1.20	18.40	16.80	32.00	3.00	41.00	20.00	27.20	4.21
Fe2O3	0.58	2.20	6.40	5.00	12.00	88.00	1.00	3.50	4.90	3.13
CaO	50.96	0.30	3.40	1.60	0.50	2.60	4.00	17.00	4.20	64.83
MgO	2.06	0.10	2.70	0.80	0.50	0.10	1.50	2.50	1.90	3.02
SO3	0.28	0.20	0.10	0.05	0.00	0.05	0.30	3.46	2.90	0.46
Loss	42.66	0.60	11.70	6.29	14.00	-3.30	16.50	3.28	0.00	0.20
Na2O	0.08	0.02	1.80	0.20	0.05	0.07	0.00	1.70	0.71	0.38
K2O	0.05	0.02	1.50	2.49	0.28	0.04	0.00	2.75	1.40	0.33
Total Alkali	0.11	0.03	2.79	1.84	0.23	0.10	0.00	3.51	1.63	0.60
TOTAL	99.93	99.64	100.00	100.13	100.33	98.56	99.30	101.69	96.81	99.40
Silica Ratio	1.63	27.94	2.18	3.07	0.93	0.09	0.83	2.02	1.67	3.11
A/F Ratio	1.52	0.55	2.88	3.36	2.67	0.03	41.00	5.71	5.55	1.35
Li e Sat. Factor	6.126	0.001	0.018	0.007	0.003	0.045	0.024	0.102	0.021	0.900
C3S	182.6	-732.0	-529.3	-621.9	-541.7	-196.2	-526.6	-431.2	-580.0	57.6
C2S	-131.0	824.6	554.1	661.0	526.2	171.0	497.6	461.4	591.2	22.1
C3A	1.4	-0.5	37.9	36.1	64.5	-140.9	107.0	47.1	63.8	5.9
C4AF	1.8	6.7	19.5	15.2	36.5	267.8	3.0	10.7	14.9	9.5
TONS/~~YEAR~~ DAY BASED ON:	2,761	264	301	0	0	30	0	44		
2,200 TONS OF CLINKER										
MOISTURE AS RCVD.	1.5	4.0	8.0	8.0	7.0	2.0	5.0	8.0		
AS RECEIVED PRICES:	$6.00	$14.00	$8.00	$9.00	$10.00	$10.00	$18.00	($5.00)		
H2O CORRECTED TONS:	2,803	275	328	0	0	30	0	48		

29¢/π LOW

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3T

SEATTLE

TYPE I MIX									GAS FIRED	
DATE	12/10/91							TACOMA		
SAMPLE IDENT #	LIMESTONE	SUPERIOR	PAC. CST	L-BAR	KAN KAT	Fe ORE	CASTL RK	BOTTOM	FUEL	
SOURCE OF --	CaO/MgO	SIO2	Al2O3	Al2O3	Al2O3	Fe2O3	Al2O3	ASH	ASH	CLINKER
MOISTURE FREE COST	$6.09	$14.58	$8.70	$9.78	$10.75	$10.20	$18.95	($5.43)		$10.909
Fraction (raw/clk ton)	1.2700	0.1120	0.1630	0.0000	0.0000	0.0120	0.0000	0.0000	type I 0.0000	Control 1.5570
Che Ical Analysis										
Si02	2.38	95.00	54.00	66.90	41.00	8.00	35.00	47.50	53.60	22.56
Al2O3	0.88	1.20	18.40	16.80	32.00	3.00	41.00	20.00	27.20	4.29
Fe2O3	0.58	2.20	6.40	5.00	12.00	88.00	1.00	3.50	4.90	3.08
CaO	50.96	0.30	3.40	1.60	0.50	2.60	4.00	17.00	4.20	65.34
MgO	2.06	0.10	2.70	0.80	0.50	0.10	1.50	2.50	1.90	3.07
SO3	0.28	0.20	0.10	0.05	0.00	0.05	0.30	3.46	2.90	0.39
Loss	42.66	0.60	11.70	6.29	14.00	-3.30	16.50	3.28	0.00	0.20
Na2O	0.08	0.02	1.80	0.20	0.05	0.07	0.00	1.70	0.71	0.40
K2O	0.05	0.02	1.50	2.49	0.28	0.04	0.00	2.75	1.40	0.31
Total Alkali	0.11	0.03	2.79	1.84	0.23	0.10	0.00	3.51	1.63	0.60
TOTAL	99.93	99.64	100.00	100.13	100.33	98.56	99.30	101.69	96.81	99.64
Silica Ratio	1.63	27.94	2.18	3.07	0.93	0.09	0.83	2.02	1.67	3.06
A/F Ratio	1.52	0.55	2.88	3.36	2.67	0.03	41.00	5.71	5.55	1.39
Li e Sat. Factor	6.126	0.001	0.018	0.007	0.003	0.045	0.024	0.102	0.021	0.916
C3S	182.6	-732.0	-529.3	-621.9	-541.7	-196.2	-526.6	-431.2	-580.0	61.3
C2S	-131.0	824.6	554.1	661.0	526.2	171.0	497.6	461.4	591.2	18.4
C3A	1.4	-0.5	37.9	36.1	64.5	-140.9	107.0	47.1	63.8	6.1
C4AF	1.8	6.7	19.5	15.2	36.5	267.8	3.0	10.7	14.9	9.4
TONS/~~YEAR~~ DAY BASED ON: 2,200 TONS OF CLINKER	2,794	246	359	0	0	26	0	0		
MOISTURE AS RCVD.	1.5	4.0	8.0	8.0	7.0	2.0	5.0	8.0		
AS RECEIVED PRICES:	$6.00	$14.00	$8.00	$9.00	$10.00	$10.00	$18.00	($5.00)		
H2O CORRECTED TONS:	2,837	257	390	0	0	27	0	0		

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4T

SEATTLE

TYPE I MIX										GAS FIRED
DATE	12/10/91							TACOMA		
SAMPLE IDENT #	LIMESTONE	SUPERIOR	PAC. CST	L-BAR	KAN KAT	Fe ORE	CASTL RK	BOTTOM	FUEL	
SOURCE OF --	CaO/MgO	SIO2	Al2O3	Al2O3	Al2O3	Fe203	Al2O3	ASH	ASH	CLINKER
MOISTURE FREE COST	$6.09	$14.58	$8.70	$9.78	$10.75	$10.20	$18.95	($5.43)		$10.656
Fraction (raw/clk ton)	1.2680	0.1175	0.1370	0.0000	0.0000	0.0133	0.0000	0.0200	0.0000	1.5558
Che ical Analysis										
Si02	2.38	95.00	54.00	66.90	41.00	8.00	35.00	47.50	53.60	22.63
Al2O3	0.88	1.20	18.40	16.80	32.00	3.00	41.00	20.00	27.20	4.22
Fe2O3	0.58	2.20	6.40	5.00	12.00	88.00	1.00	3.50	4.90	3.11
CaO	50.96	0.30	3.40	1.60	0.50	2.60	4.00	17.00	4.20	65.49
MgO	2.06	0.10	2.70	0.80	0.50	0.10	1.50	2.50	1.90	3.05
SO3	0.28	0.20	0.10	0.05	0.00	0.05	0.30	3.46	2.90	0.46
Loss	42.66	0.60	11.70	6.29	14.00	-3.30	16.50	3.28	0.00	0.20
Na2O	0.08	0.02	1.80	0.20	0.05	0.07	0.00	1.70	0.71	0.39
K2O	0.05	0.02	1.50	2.49	0.28	0.04	0.00	2.75	1.40	0.33
Total Alkali	0.11	0.03	2.79	1.84	0.23	0.10	0.00	3.51	1.63	0.60
TOTAL	99.93	99.64	100.00	100.13	100.33	98.56	99.30	101.69	96.81	99.88
Silica Ratio	1.63	27.94	2.18	3.07	0.93	0.09	0.83	2.02	1.67	3.09
A/F Ratio	1.52	0.55	2.88	3.36	2.67	0.03	41.00	5.71	5.55	1.36
Li e Sat. Factor	6.126	0.001	0.018	0.007	0.003	0.045	0.024	0.102	0.021	0.917
C3S	182.6	-732.0	-529.3	-621.9	-541.7	-196.2	-526.6	-431.2	-580.0	61.8
C2S	-131.0	824.6	554.1	661.0	526.2	171.0	497.6	461.4	591.2	18.3
C3A	1.4	-0.5	37.9	36.1	64.5	-140.9	107.0	47.1	63.8	5.9
C4AF	1.8	6.7	19.5	15.2	36.5	267.8	3.0	10.7	14.9	9.5
TONS/~~YEAR~~ DAY BASED ON: 2,200 TONS OF CLINKER	2,790	259	301	0	0	29	0	44		
MOISTURE AS RCVD.	1.5	4.0	8.0	8.0	7.0	2.0	5.0	8.0		
AS RECEIVED PRICES:	$6.00	$14.00	$8.00	$9.00	$10.00	$10.00	$18.00	($5.00)		
H2O CORRECTED TONS:	2,832	269	328	0	0	30	0	48		

25¢/T Low+

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