Sengupta, Abhijit

From: Williams, Charles R. [Charles.Williams@pgnmail.com]
Sent: Monday, November 30, 2009 1:23 PM
To: Lake, Louis; Thomas, George; nausdj@ornl.gov; Carrion, Robert
Subject: Draft Refute 2.5 for review
Attachments: FM 2.5.pptx; Ambient v concrete temp bay 15 ver 3.pdf; Ambient v concrete temp bay 12 ver 2.pdf; Ice in Pour263RB.pdf; all strength table.pdf; all strength graph.pdf; 7 and 28 day strength.pdf

Cannot open

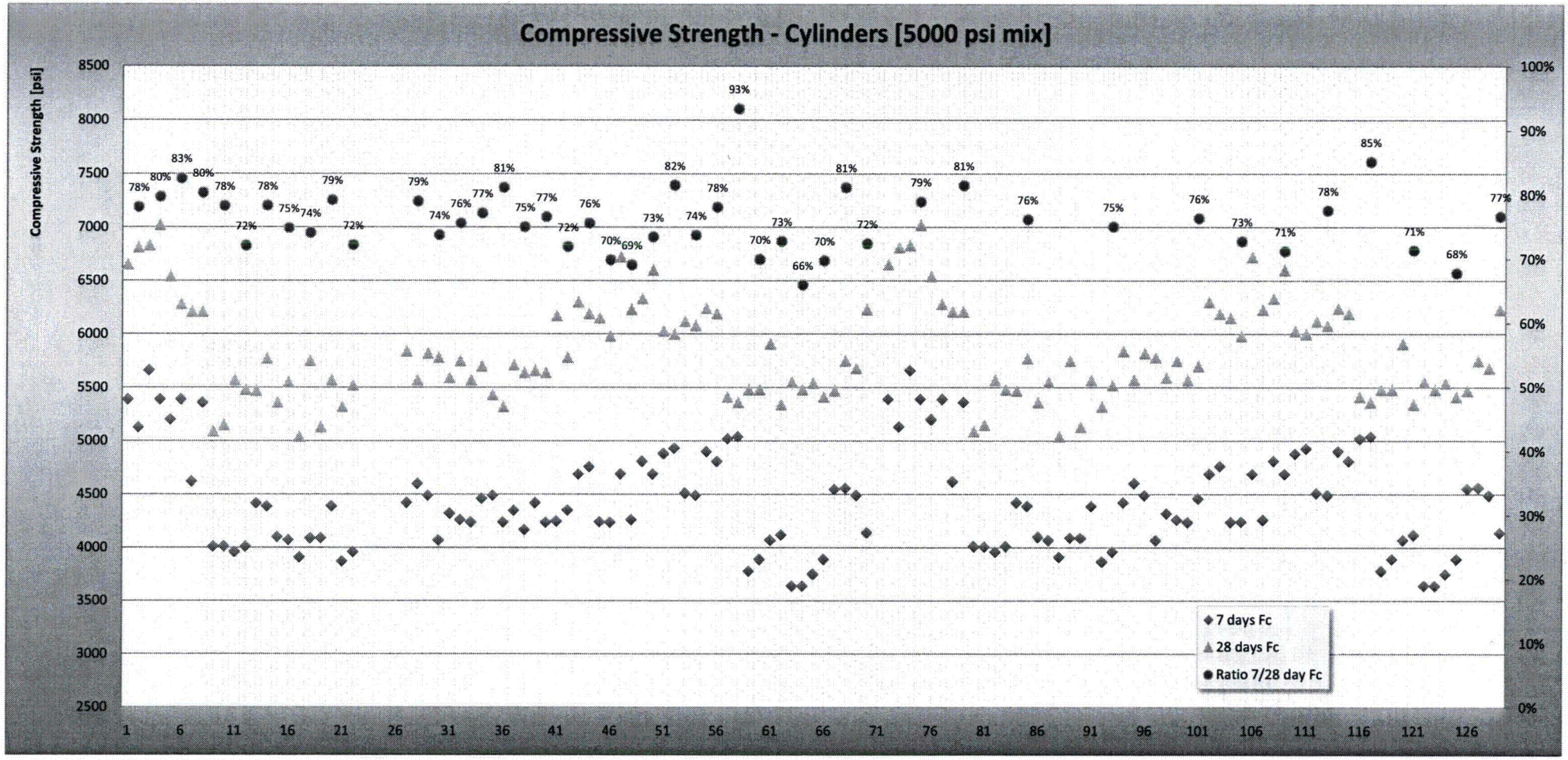
1 page 1 page 6 pages 3 pages 1 page 1 page

Mr Lake and others,
Attached is the draft refute 2.5 document and supporting documents for your review. Please let me know if you have any questions.

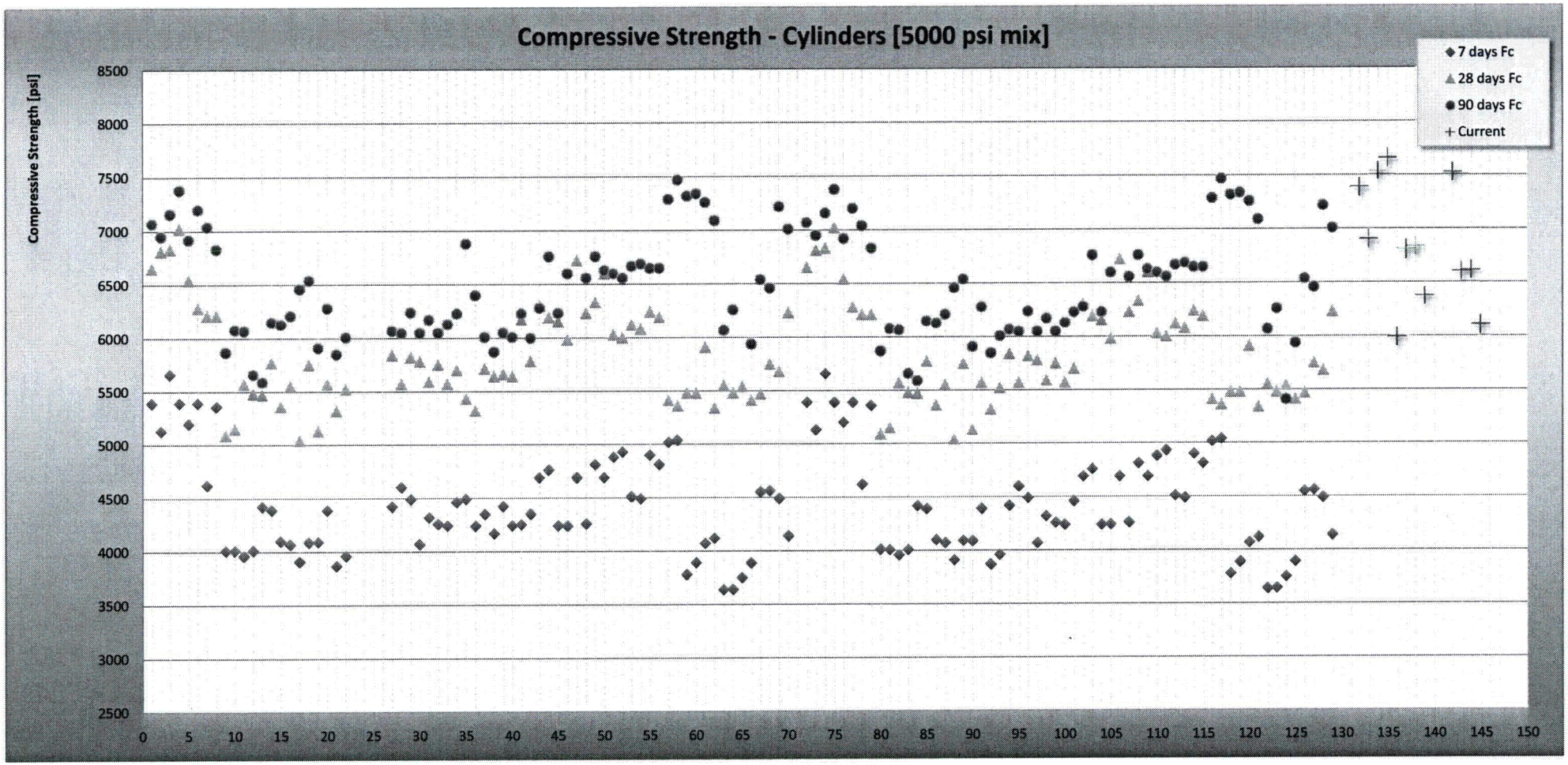
Charles Williams
919-516-7417

P/185

FM 2.5 Exhibit 4



2.5 Exhibit 3, pg 1 of 2



	Pour Number		7 days		28 days		90 days		Current		Ratios 7/28 days	Ratios 90/28 days
1		1926	5390		6650		7070					
2		DM-5	5130	5260	6810	6730	6950	7010			78%	104%
3		1927	5660		6830		7160					
4		DM-5	5390	5525	7020	6925	7380	7270			80%	105%
5		1932	5200		6540		6920					
6		DM-5	5390	5295	6280	6410	7200	7060			83%	110%
7		1934	4620		6210		7040					
8		DM-5	5360	4990	6210	6210	6830	6935			80%	112%
9		2064	4010		5090		5870					
10		727550-2	4010	4010	5150	5120	6080	5975			78%	117%
11		2065	3960		5570		6070					
12		727550-2	4010	3985	5480	5525	5660	5865			72%	106%
13		2066	4420		5470		5590					
14		727550-2	4390	4405	5770	5620	6150	5870			78%	104%
15		2071	4100		5360		6130					
16		727550-2	4070	4085	5550	5455	6210	6170			75%	113%
17		2072	3910		5040		6460					
18		727550-2	4090	4000	5750	5395	6540	6500			74%	120%
19		2073	4090		5130		5910					
20		727550-2	4390	4240	5570	5350	6280	6095			79%	114%
21		2074	3870		5320		5850					
22		727550-2	3960	3915	5520	5420	6010	5930			72%	109%
23		2075										
24		727550-2										
25		2076										
26		727550-2										
27		2117	4420		5840		6070					
28		727550-2	4600	4510	5570	5705	6050	6060			79%	106%
29		2118	4490		5820		6240					
30		727550-2	4070	4280	5780	5800	6050	6145			74%	106%
31		2119	4320		5590		6170					
32		727550-2	4260	4290	5750	5670	6050	6110			76%	108%
33		2120	4240		5570		6130					
34		727550-2	4460	4350	5700	5635	6230	6180			77%	110%
35		2121	4490		5430		6880					
36		727550-2	4240	4365	5320	5375	6400	6640			81%	124%
37		2122	4350		5710		6010					
38		727550-2	4170	4260	5640	5675	5870	5940			75%	105%
39		2123	4420		5660		6050					
40		727550-2	4240	4330	5640	5650	6010	6030			77%	107%
41		2124	4250		6170		6230					
42		727550-2	4350	4300	5780	5975	6000	6115			72%	102%
43		2157	4690		6300		6280					
44		DM-5	4760	4725	6190	6245	6760	6520			76%	104%
45		2158	4240		6150		6230					
46		DM-5	4240	4240	5980	6065	6600	6415			70%	106%
47		2166	4690		6720							
48		DM-5	4260	4475	6230	6475	6560	6560			69%	101%
49		2167	4810		6330		6760					
50		DM-5	4690	4750	6600	6465	6630	6695			73%	104%
51		2171	4880		6030		6600					
52		DM-5	4930	4905	6000	6015	6560	6580			82%	109%
53		2172	4510		6120		6670					
54		DM-5	4490	4500	6080	6100	6690	6680			74%	110%
55		2181	4900		6240		6650					
56			4810	4855	6190	6215	6650	6650			78%	107%

	Number		7 days		28 days		90 days		Current		7/28 days	90/28 days
57		2182	5020		5410		7290					
58			5040	5030	5360	5385	7470	7380			93%	137%
59		2196	3780		5480		7320					
60			3890	3835	5480	5480	7340	7330			70%	134%
61		2197	4070		5910		7260					
62			4120	4095	5340	5625	7090	7175			73%	128%
63		2219	3640		5550		6070					
64			3640	3640	5480	5515	6260	6165			66%	112%
65		2220	3750		5540							
66			3890	3820	5410	5475	5940	5940			70%	108%
67		2225	4550		5470		6540					
68		727550-2	4560	4555	5750	5610	6460	6500			81%	116%
69		2226	4490		5680		7220					
70		727550-2	4140	4315	6230	5955	7010	7115			72%	119%
71												
72	522	1926	5390		6650		7070					
73	522	1926	5130		6810		6950					
74	522	1927	5660		6830		7160					
75	522	1927	5390	5393	7020	6828	7380	7140			79%	105%
76	528	1932	5200		6540		6920					
77	528	1932	5390		6280		7200					
78	528	1934	4620		6210		7040					
79	528	1934	5360	5143	6210	6310	6830	6998			81%	111%
80	634	2064	4010		5090		5870					
81	634	2064	4010		5150		6080					
82	634	2065	3960		5570		6070					
83	634	2065	4010		5480		5660					
84	634	2066	4420		5470		5590					
85	634	2066	4390	4133	5770	5422	6150	5903			76%	109%
86	641	2071	4100		5360		6130					
87	641	2071	4070		5550		6210					
88	641	2072	3910		5040		6460					
89	641	2072	4090		5750		6540					
90	641	2073	4090		5130		5910					
91	641	2073	4390		5570		6280					
92	641	2074	3870		5320		5850					
93	641	2074	3960	4060	5520	5405	6010	6174			75%	114%
94	666	2117	4420		5840		6070					
95	666	2117	4600		5570		6050					
96	666	2118	4490		5820		6240					
97	666	2118	4070		5780		6050					
98	666	2119	4320		5590		6170					
99	666	2119	4260		5750		6050					
100	666	2120	4240		5570		6130					
101	666	2120	4460	4358	5700	5703	6230	6124			76%	107%
102	685	2157	4690		6300		6280					
103	685	2157	4760		6190		6760					
104	685	2158	4240		6150		6230					
105	685	2158	4240	4483	5980	6155	6600	6468			73%	105%
106	695	2166	4690		6720							
107	695	2166	4260		6230		6560					
108	695	2167	4810		6330		6760					
109	695	2167	4690	4613	6600	6470	6630	6650			71%	103%
110	700	2171	4880		6030		6600					
111	700	2171	4930		6000		6560					
112	700	2172	4510		6120		6670					
113	700	2172	4490	4703	6080	6058	6690	6630			78%	109%

Concrete Strength Over Time

	Number	7 days			28 days		90 days		Current		7/28 days	90/28 days
114	712	2181	4900		6240		6650					
115	712	2181	4810		6190		6650					
116	712	2182	5020		5410		7290					
117	712	2182	5040	4943	5360	5800	7470	7015			85%	121%
118	722	2196	3780		5480		7320					
119	722	2196	3890		5480		7340					
120	722	2197	4070		5910		7260					
121	722	2197	4120	3965	5340	5553	7090	7253			71%	131%
122	737	2219	3640		5550		6070					
123	737	2219	3640		5480		6260					
124	737	2220	3750		5540		5410					
125	737	2220	3890	3730	5410	5495	5940	5920			68%	108%
126	743	2225	4550		5470		6540					
127	743	2225	4560		5750		6460					
128	743	2226	4490		5680		7220					
129	743	2226	4140	4435	6230	5783	7010	6808			77%	118%
130												
131									7900			
132									7380	7393		
133									6900			
134									7530			
135									7650			
136									5990			
137									6800			
138									6830			
139									6370			
140									8220			
141									8030			
142									7520			
143									6600			
144									6610			
145									6100			
146												
147												
148												
149												
150												
151												
152												
153												
154												
155												
156												
157												
158												
159												
160		7 days			28 days		90 days		Current		Ratios	
161		average:	4436	4446	5837	5850	6491	6504	7095	7393	76%	111%
162		Std:	473	459	464	440	494	470	705	#DIV/0!	5%	8%
163		Max:	5660	5525	7020	6925	7470	7380	8220	7393	93%	137%
164		Min:	3640	3640	5040	5120	5410	5865	5990	7393	66%	101%

PITTSBURGH TESTING LABORATORY

FM 2.5 Exhibit 2, pg 1 of 6

PITTSBURGH, PA.

Order No. TA-7732
Supplier's Delivery
Serial No. 16416

REPORTED TO: FLORIDA POWER CORP.
PROJECT: CRYSTAL RIVER PLANT UNIT NO. 3
Concrete Supplier: West Coast Concrete, Inc.
Arch-Engineer: Gilbert Assoc., Inc.
General Contractor: J. A. Jones

Date 9-18-71 Time Loaded 8 20 Class 5CM Mass ☑ Other ☐
Truck No. 154 Load No. 1 Cu. Yds. 3 Counter to 0 ☑
Cum. Cu. Yds. 3 °F Moisture: F.A. 3.5 % 239 Lbs: C.A. ____ % ____ Lbs.

	Design S.S.D. Wt.	Adj. Batch Wt.
Cement (Type) II	3480	3486
C.A. (Size ____)		
(Size ____)		
F.A.	6825	6060
Daratard HCF	75	75
Darex AEA		
Water, ~~Gals/Lbs~~	1380 Total	1546 Added
Ice		600 Lbs. ____ Gals.
Total Moisture		239 Lbs. ____ Gals.
Total Water		1385 Gals.

Rev. at Mixing Speed: Start 0 Finish 70 Diff. 70 (100 Max.)

Signature of Batch Plant Inspector: E. A. Fox

Portion of Structure Where Placed: 262 RB
Time of Arr. 840 Total Rev. ____ (300 Max.)
Time Placement Comp. ____ Elapsed Time ____ (1½ Hr. Max.)
Ambient Temp. ____ °F Concrete Temp. ____ °F Slump ____ (1-4")

Remarks: Cylinder No's. ____ Air % ____

Water Added in Field: ____ Gal./Cu. Yd.
Rev. Start: ____ Finish: ____ Difference ____ (30 Min.)
Remarks: Sent to Unit #2 at request of Ed Shows

Field Inspectors Signature: [illegible]

PITTSBURGH TESTING LABORATORY

PITTSBURGH, PA.

FM 2.5 Exhibit 2, pg 2 of 6

Order No. TA-7732
Supplier's Delivery
Serial No. 16412

REPORTED TO: FLORIDA POWER CORP.
PROJECT: CRYSTAL RIVER PLANT UNIT NO. 3
Concrete Supplier: West Coast Concrete, Inc.
Arch-Engineer: Gilbert Assoc., Inc.
General Contractor: J. A. Jones

Date 9-18-71 Time Loaded 1020 Class SCM Mass ☑ Other ☐
Truck No. 152 Load No. 2 Cu. Yds. 3 Counter to 0 ☑
Cum. Cu. Yds. 6 °F Moisture: F.A. 3.5 % 239 Lbs; C.A. ____ % ____ Lbs.

	Design S.S.D. Wt.	Adj. Batch Wt.
Cement (Type) II	3480	3486
C.A. (Size ____)		
(Size ____)		
F.A.	6825	7010
Daratard HCF	75	75
Darex AEA		
Water, Gals.	1380 Total	540 Added
Ice		600 Lbs. ____ Gals.
Total Moisture		239 Lbs. ____ Gals.
Total Water		1379 Gals.

Rev. at Mixing Speed: Start 0 Finish 70 Diff. 70 (100 Max.)

Signature of Batch Plant Inspector: E. A. Fox

Portion of Structure Where Placed: 26 23RB
Time of Arr. 1038 Total Rev. 137 (300 Max.)
Time Placement Comp. 11:20 Elapsed Time 60 (1½ Hr. Max.)
Ambient Temp. 86 °F Concrete Temp. 70 °F Slump 7 (1-4")

Remarks:

Cylinder No's.	Air %
401 ABCDEF	/

Water Added in Field: 2 Gal./Cu. Yd.
Rev. Start: 135 Finish: 175 Difference ____ (30 Min.)
Remarks:

Field Inspectors Signature: Smo

PITTSBURGH TESTING LABORATORY

PITTSBURGH, PA.

FM 2.5 Exhibit 2, pg 3 of 6

Order No. TA-7732
Supplier's Delivery
Serial No. 16418

REPORTED TO: FLORIDA POWER CORP.
PROJECT: CRYSTAL RIVER PLANT UNIT NO. 3
Concrete Supplier: West Coast Concrete, Inc.
Arch-Engineer: Gilbert Assoc., Inc.
General Contractor: J. A. Jones

Date 9-18-71 Time Loaded 12 24 Class SCM Mass ☒ Other ☐
Truck No. 157 Load No. 3 Cu. Yds. 3 Counter to 0 ☒
Cum. Cu. Yds. 9 °F Moisture: F.A. 3.5 % 239 Lbs; C.A. ____ % ____ Lbs.

	Design S.S.D. Wt.	Adj. Batch Wt.
Cement (Type) II	3480	3510
C.A. (Size ____)		
(Size ____)		
F.A.	6825	7080
Daratard HCF	75	75
Darex AEA		
Water, Gals.	1380 Total	541 Added
Ice		600 Lbs. Gals.
Total Moisture		239 Lbs. Gals.
Total Water		1380 Gals.

Rev. at Mixing Speed: Start 0 Finish 70 Diff. 70 (100 Max.)
Signature of Batch Plant Inspector: E. A. Fox

Portion of Structure Where Placed: 23 23 R B
Time of Arr. 12:45 Total Rev. ____ (300 Max.)
Time Placement Comp. ____ Elapsed Time ____ (1½ Hr. Max.)
Ambient Temp. 92 °F Concrete Temp. 70 °F Slump 3 (1-4")

Remarks: Cylinder No's. ____ Air % ____

Water Added in Field: ____ Gal./Cu. Yd. ____
Rev. Start: ____ Finish: ____ Difference ____ (30 Min.)
Remarks:

Field Inspectors Signature: [illegible]

PITTSBURGH TESTING LABORATORY

FM 2.5 Exhibit 2 pg 4 of 6

PITTSBURGH, PA.

Order No. TA-7732
Supplier's Delivery
Serial No. 19945

REPORTED TO: FLORIDA POWER CORP.
PROJECT: CRYSTAL RIVER PLANT UNIT NO. 3
Concrete Supplier: West Coast Concrete, Inc.
Arch-Engineer: Gilbert Assoc., Inc.
General Contractor: J. A. Jones

Date 9-18-71 Time Loaded 8²⁶ Class DW-5 Mass ☑ Other ☐
Truck No. 147 Load No. 1 Cu. Yds. 8 Counter to 0 ☑
Cum. Cu. Yds. 8 °F Moisture: F.A. 4.5 % 410 Lbs; C.A. 1.5 % 216 Lbs.

	Design S.S.D. Wt.	Adj. Batch Wt.
Cement (Type) II	5080	5076
C.A. (Size 67)	14400	14730
(Size)		
F.A.	9120	9540
Daratard HCF	168	168
Darex AEA	28	28
Water, Gals.	2208 Total	483 Added
Ice		1100 Lbs. Gals.
Total Moisture		626 Lbs. Gals.
Total Water		2209 Gals.

Rev. at Mixing Speed: Start 0 Finish 70 Diff. 70 (100 Max.)
Signature of Batch Plant Inspector: E. C. Fox

Portion of Structure Where Placed:
Time of Arr. Total Rev. (300 Max.)
Time Placement Comp. Elapsed Time (1½ Hr. Max.)
Ambient Temp. °F Concrete Temp. °F Slump (1-4")

Remarks: Cylinder No's. Air %

Water Added in Field: Gal./Cu. Yd.
Rev. Start: Finish: Difference (30 Min.)
Remarks: Sent to Unit #2 request E/Slump

Field Inspectors Signature: JWB

PITTSBURGH TESTING LABORATORY

FM 2.5 Exhibit 2, pg 5 of 6

PITTSBURGH, PA.

Order No. TA-7732
Supplier's Delivery
Serial No. 19946

REPORTED TO: FLORIDA POWER CORP.
PROJECT: CRYSTAL RIVER PLANT UNIT NO. 3
Concrete Supplier: West Coast Concrete, Inc.
Arch-Engineer: Gilbert Assoc., Inc.
General Contractor: J. A. Jones

Date 9-18-71 Time Loaded 1028 Class DM-5 Mass ☒ Other ☐
Truck No. 150 Load No. 2 Cu. Yds. 8 Counter to 0 ☒
Cum. Cu. Yds. 16 °F Moisture: F.A. 4.25 % 388 Lbs; C.A. 1.5 % 216 Lbs.

	Design S.S.D. Wt.	Adj. Batch Wt.
Cement (Type) II	5080	5080
C.A. (Size 67)	14400	14700
(Size)		
F.A.	9120	9480
Daratard HCF	168	168
Darex AEA	28	28
Water, Gals.	2208 Total	454 Added
Ice		1150 Lbs. Gals.
Total Moisture		604 Lbs. Gals.
Total Water		2208 Gals.

Rev. at Mixing Speed: Start 0 Finish 70 Diff. 70 (100 Max.)

Signature of Batch Plant Inspector: E. G. Fox

Portion of Structure Where Placed: 26 23RB
Time of Arr. 1025 Total Rev. (300 Max.)
Time Placement Comp. Elapsed Time (1½ Hr. Max.)
Ambient Temp. 87 °F Concrete Temp. 70 °F Slump (1-4")

Remarks: Cylinder No's. Air %

Water Added in Field: Gal./Cu. Yd.
Rev. Start: Finish: Difference (30 Min.)
Remarks: Reject 4" Slump

Field Inspectors Signature: H. Faulkner

PITTSBURGH TESTING LABORATORY

FM 2.5 Exhibit 2, pg 6 of 6

PITTSBURGH, PA.

Order No. TA-7732
Supplier's Delivery
Serial No. 19947

REPORTED TO: FLORIDA POWER CORP.
PROJECT: CRYSTAL RIVER PLANT UNIT NO. 3
Concrete Supplier: West Coast Concrete, Inc.
Arch-Engineer: Gilbert Assoc., Inc.
General Contractor: J. A. Jones

Date 9-18-71 Time Loaded 11 33 Class DM-5 Mass ☑ Other ☐
Truck No. 154 Load No. 3 Cu. Yds. 8 Counter to 0 ☑
Cum. Cu. Yds. 24 °F Moisture: F.A. 4.25 % 388 Lbs; C.A. 1.5 % 216 Lbs.

	Design S.S.D. Wt.		Adj. Batch Wt.	
Cement (Type) II	5080		5052	
C.A. (Size 67)	14400		14200	
(Size)				
F.A.	9920		9490	
Daratard HCF	168		168	
Darex AEA	28		28	
Water, Gals.	2208	Total	454	Added
Ice			1150 Lbs.	Gals.
Total Moisture			604 Lbs.	Gals.
Total Water			2208	Gals.

Rev. at Mixing Speed: Start 0 Finish 70 Diff. 70 (100 Max.)

Signature of Batch Plant Inspector: E. A. Fox

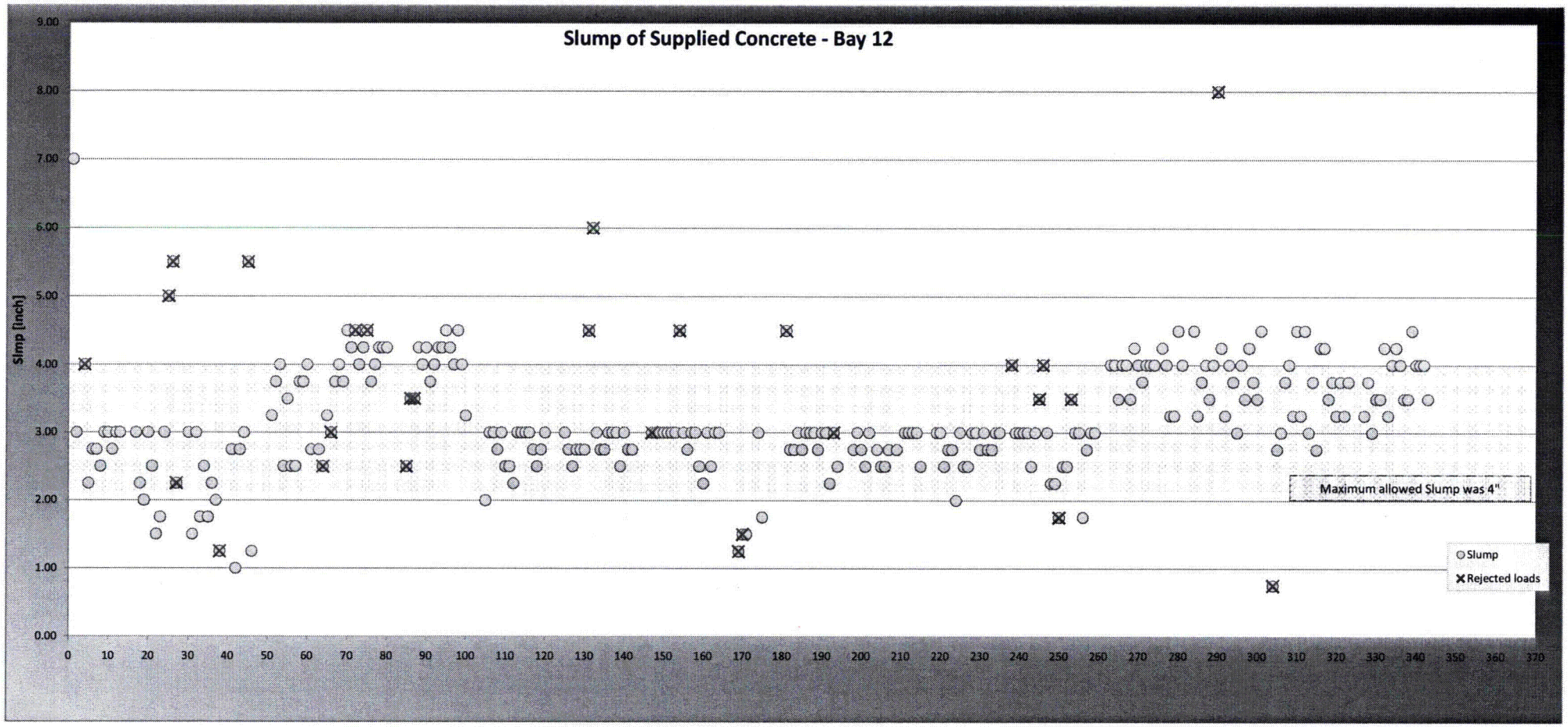
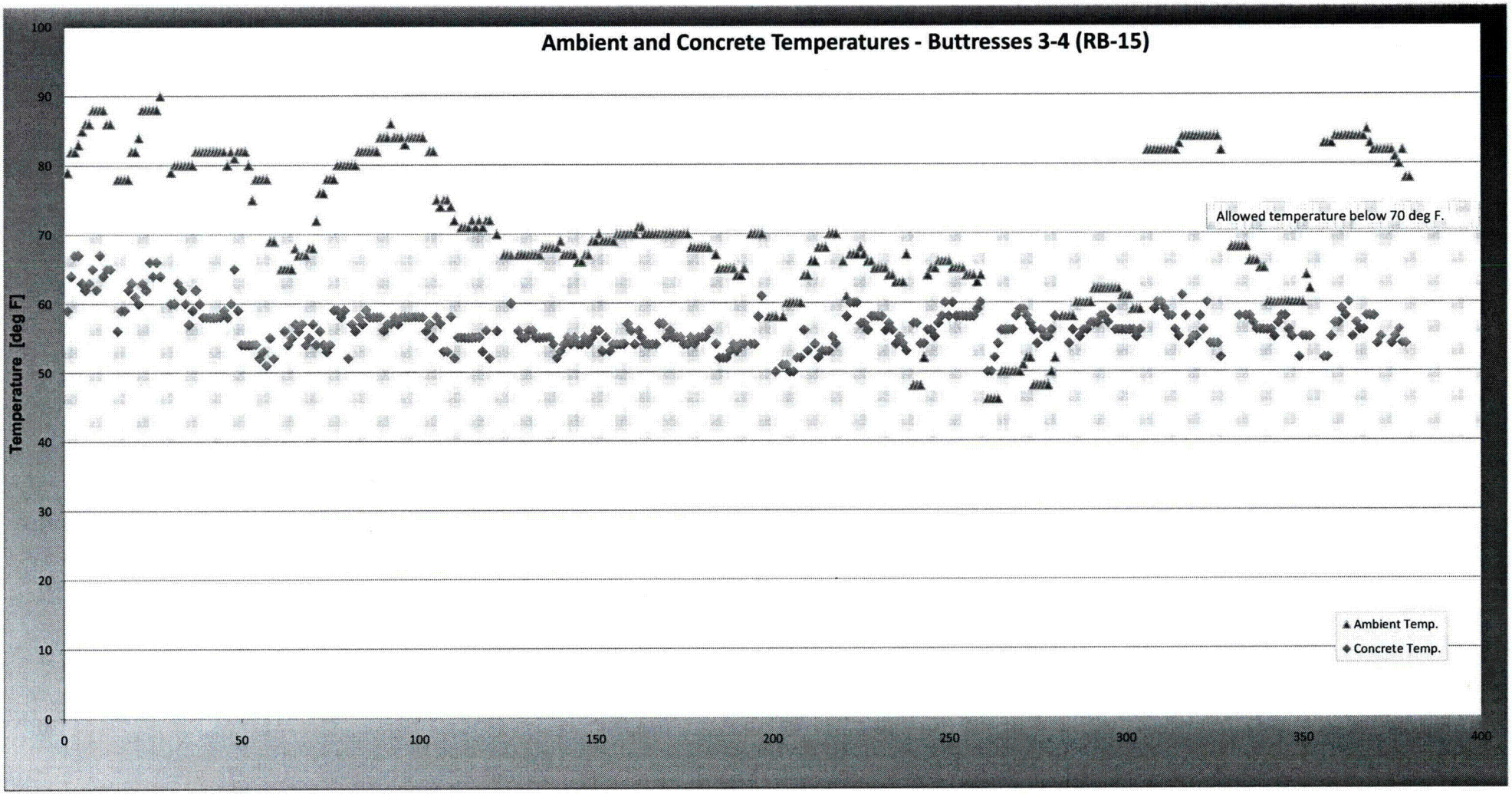
Portion of Structure Where Placed: 26 3RB
Time of Arr. 11 55 Total Rev. 134 (300 Max.)
Time Placement Comp. 12:35 Elapsed Time 62 (1½ Hr. Max.)
Ambient Temp. 88 °F Concrete Temp. 70 °F Slump 2¼ (1-4")

Remarks: Cylinder No's. Air % 4.0

Water Added in Field: _____ Gal./Cu. Yd.
Rev. Start: _____ Finish: _____ Difference _____ (30 Min.)
Remarks: 142 yeild

Field Inspectors Signature: [illegible]

FM 2.5 Exhibit 1 pg 1 of 2



FM 2.5 Exhibit 1 pg 2 of 2