

October 30, 1992
File: 11-4254-01
Lab No.: 3202

Mr. Dave Ross
Xypex Chemical Corporation
13731 Mayfield Place
Richmond, B.C., Canada

**Subject: Time of Setting Tests on Concrete
Trial Batches Using MBL-82 and Xypex
Your P.O. No. 3418**

Dear Mr. Ross:

Attached are results of four laboratory trial batches prepared as requested from Central Concrete mix design No. 2773. Time of Setting Tests (ASTM C403) were performed to determine the initial and final setting times for these mixes.

A control mix, Trial Batch No. 1, was prepared from mix No. 2773 without any admixtures. The remaining three trial batches used the same mix design No. 2773 except that Trial Batch No. 2 used MBL-82, Trial Batch No. 3 used Xypex @ 2% by cement wt. and Trial Batch No. 4 used both the MBL-82 and Xypex.

Following is a summary of results:


<u>Trial Batch</u>	<u>Compressive Strength (psi)</u>		<u>Setting Time (min.)</u>	
	<u>7 Day</u>	<u>28 Day</u>	<u>Initial</u>	<u>Final</u>
No. 1 Control	4730	6460	260	360
No. 2 w/MBL-82	5040	6940	280	370
No. 3 w/Xypex	5350	7160	430	525
No. 4 w/MBL and Xypex	5300	7620	520	600

Test results of the 56 day compressive strengths will be reported when completed.

Contact me if you have any questions or need further information. We appreciate your business and look forward to more work in the future.

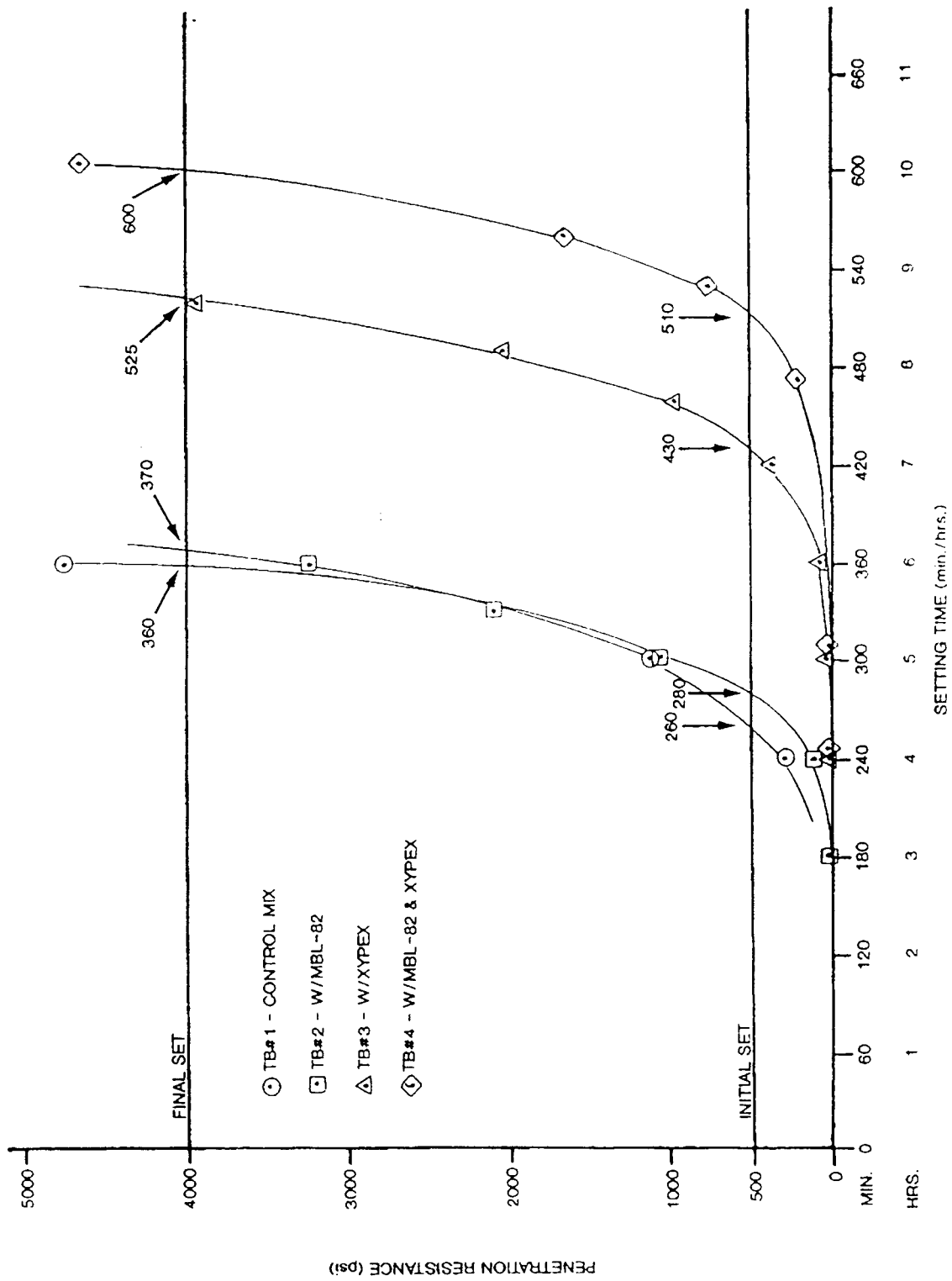
Sincerely,

KLEINFELDER, INC.


Clifford N. Craig, C.E.
Operations Manager

CNC/tb61-63
Enclosure

1992



XYPEX Chemical Corp.
 Concrete Trial Batch Testing
TIME OF SETTING OF CONCRETE MIXTURES (ASTM C403)
PLOT OF RESULTS

KLEINFELDER

PROJECT NO. 11-4254-01 CNC/LAJ 11/92

PLATE

Xypex Chemical Corp.
Concrete Trial Batch Testing

File No.: 11-4254-01
Date: October 30, 1992
Lab No.: 3202

CONCRETE LABORATORY TRIAL BATCH NO. 1
Central Concrete Mix No. 2773 Batched by Kleinfelder

MATERIALS

QUANTITIES (LBS.)

		<u>Design-SSD(pcy)</u>	<u>Batched (3.0 cf)</u>
Cement	(Lonestar Type II)	620	68.9
Fly Ash	(Pozzolanic International)	109	12.1
Coarse Aggregates	(Mountain View) 1"xNo.4	1750	197.1 (1.4% free moist)
Fine Aggregates	(Olympia Felton)	1264	145.8 (3.9% free moist)
Water		275	28.1
Admixtures	MBL-82	6 fl.oz./cwt	0 cc
Total Weight		4018	452.0

TRIAL MIX RESULTS - ASTM C94
(3.0 cu.ft. Batched 9-29-92)

Slump	3-3/4"	Design Water Demand	275	pcy
Air Content (vol.)	1.2%	Design Water Cementitious Ratio	0.38	
Air Temperature	80°F	Batched Water Content	326	lbs (pcy)
Mix Temperature	78°F	Batched Water Cementitious Ratio	0.45	
Fresh Unit Weight	149.3 pcf	Relative Yield	1.01	

COMPRESSIVE STRENGTH
(psi) - ASTM C-39
6x12 Cyls - Moist Cured

TIME OF SETTING OF CONCRETE
ASTM C403

Age:	<u>1 Day</u>	<u>3 Days</u>	<u>7 Days</u>	<u>28 Days*</u>
	1780	3100	4730	6600
				6330
Avg:				6460

<u>Time</u> (min.)	<u>Penetration</u> Resistance (psi)
240	290
300	1113
360	4780

Initial Setting @ 500 psi = 260 min. (4.3 hrs.)
Final Setting @ 4000 psi = 360 min. (6.0 hrs.)

Notes: *56 Day tests to be reported later when test complete



Xypex Chemical Corp.
Concrete Trial Batch Testing

File No.: 11-4254-01
Date: October 30, 1992
Lab No.: 3202

CONCRETE LABORATORY TRIAL BATCH NO. 2
Central Concrete Mix No. 2773 Batched by Kleinfeider

MATERIALS

QUANTITIES (LBS.)

		<u>Design-SSD(pcy)</u>	<u>Batched (3.0 cf)</u>
Cement	(Lonestar Type II)	620	68.9
Fly Ash	(Pozzolanic International)	109	12.1
Coarse Aggregates	(Mountain View) 1"xNo.4	1750	197.1 (1.4% free moist)
Fine Aggregates	(Olympia Felton)	1264	145.8 (3.9% free moist)
Water		275	25.7
Admixtures	MBL-82	6 fl.oz./cwt	144 cc
Total Weight		4018	449.6

TRIAL MIX RESULTS - ASTM C94
(3.0 cu. ft. Batched 9-29-92)

Slump	4"	Design Water Demand	275	pcy
Air Content (vol.)	2.0%	Design Water Cementitious Ratio	0.38	
Air Temperature	85°F	Batched Water Content	304	lbs (pcy)
Mix Temperature	82°F	Batched Water Cementitious Ratio	0.42	
Fresh Unit Weight	---	Relative Yield	---	

COMPRESSIVE STRENGTH
(psi) - ASTM C39
6x12 Cyls - Moist Cured

TIME OF SETTING OF CONCRETE
ASTM C403

Age:	<u>1 Day</u>	<u>3 Days</u>	<u>7 Days</u>	<u>28 Days*</u>	<u>Time (min.)</u>	<u>Penetration Resistance (psi)</u>
	1940	3810	5040	6870	180	17
				7020	240	106
					270	354
Avg:			6940		300	1022
					330	2105
					360	3250
					390	6850

Initial Setting @ 500 psi = 280 min. (4.7 hrs.)
Final Setting @ 4000 psi = 370 min. (6.2 hrs.)

Notes: *56 Day tests to be reported later when test complete



Xypex Chemical Corp.
Concrete Trial Batch Testing

File No.: 11-4254-01
Date: October 30, 1992
Lab No.: 3202

CONCRETE LABORATORY TRIAL BATCH NO. 3
Central Concrete Mix No. 2773 Batched by Kleinfelder

MATERIALS

QUANTITIES (LBS.)

		<u>Design-SSD(pcy)</u>	<u>Batched (3.0 cf)</u>
Cement	(Lonestar Type II)	620	68.9
Fly Ash	(Pozzolanic International)	109	12.1
Coarse Aggregates	(Mountain View) 1"xNo.4	1750	197.1 (1.4% free moist)
Fine Aggregates	(Olympia Felton)	1264	145.8 (3.9% free moist)
Water		275	26.2
Admixtures	MBL-82	6 fl.oz./cwt	0 cc
	Xypex (2% cement wt.)	12.4	1.38 lbs
Total Weight		4018	451.5

TRIAL MIX RESULTS - ASTM C94
(3.0 cu.ft. Batched 9-30-92)

Slump	3-1/2"	Design Water Demand	275	pcy
Air Content (vol.)	2.0%	Design Water Cementitious Ratio	0.38	
Air Temperature	72°F	Batched Water Content	309	lbs (pcy)
Mix Temperature	78°F	Batched Water Cementitious Ratio	0.42	
Fresh Unit Weight	---	Relative Yield	---	

COMPRESSIVE STRENGTH
(psi) - ASTM C39
6x12 Cyls - Moist Cured

TIME OF SETTING OF CONCRETE
ASTM C403

Age:	<u>1 Day</u>	<u>3 Days</u>	<u>7 Days</u>	<u>28 Days*</u>	<u>Time (min.)</u>	<u>Penetration Resistance (psi)</u>
	1870	3860	5350	7060	240	9
				7250	300	19
					360	75
Avg:			7160		420	371
					460	960
					490	2015
					520	3940
					540	5310

Initial Setting @ 500 psi = 430 min. (7.2 hrs.)
Final Setting @ 4000 psi = 525 min. (8.8 hrs.)

Notes: *56 Day tests to be reported later when test complete

CNC/tb61-63

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Xypex Chemical Corp.
Concrete Trial Batch Testing

File No.: 11-4254-01
Date: October 30, 1992
Lab No.: 3202

CONCRETE LABORATORY TRIAL BATCH NO. 4
Central Concrete Mix No. 2773 Batched by Kleinfielder

MATERIALS

QUANTITIES (LBS.)

		<u>Design-SSD(pcy)</u>	<u>Batched (3.0 cf)</u>
Cement	(Lonestar Type II)	620	68.9
Fly Ash	(Pozzolanic International)	109	12.1
Coarse Aggregates	(Mountain View) 1"xNo.4	1750	197.1 (1.4% free moist)
Fine Aggregates	(Olympia Felton)	1264	145.8 (3.9% free moist)
Water		275	26.3
Admixtures	MBL-82	6 fl.oz./cwt	144 cc
	Xypex (2% cement wt.)	<u>12.4</u>	<u>1.38</u> lbs
Total Weight		4018	451.6

TRIAL MIX RESULTS - ASTM C94
(3.0 cu.ft. Batched 9-30-92)

Slump	3-1/2"	Design Water Demand	275	pcy
Air Content (vol.)	2.0%	Design Water Cementitious Ratio	0.38	
Air Temperature	80°F	Batched Water Content	310	lbs (pcy)
Mix Temperature	79°F	Batched Water Cementitious Ratio	0.42	
Fresh Unit Weight	---	Relative Yield	---	

COMPRESSIVE STRENGTH
(psi) - ASTM C39
6x12 Cyls - Moist Cured

TIME OF SETTING OF CONCRETE
ASTM C403

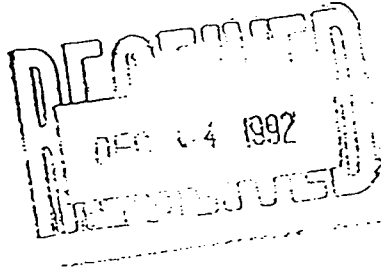
Age:	<u>1 Day</u>	<u>3 Days</u>	<u>7 Days</u>	<u>28 Days*</u>	<u>Time</u> <u>(min.)</u>	<u>Penetration</u> <u>Resistance (psi)</u>
	1880	4270	5300	7820	240	8
				7410	300	10
					472	209
Avg:				7620	527	750
					560	1650
					606	4660

Initial Setting @ 500 psi = 510 min. (8.5 hrs.)
Final Setting @ 4000 psi = 600 min. (10.0 hrs.)

Notes: *56 Day tests to be reported later when test complete



December 1, 1992
File: 11-4254-01
Lab No.: 3202



Mr. Dave Ross
Xypex Chemical Corporation
13731 Mayfield Place
Richmond, B.C., Canada V6V 269

Subject: 56 Day Compression Tests on Concrete Trial Batches Using MBL-82 and Xypex, Your P.O. No. 3418

Dear Dave:

Following are the results of 56 Day Compression Strength tests performed on the subject trial batches which we reported on October 30, 1992:

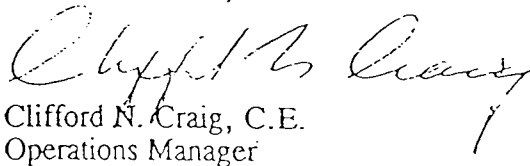
<u>Trial Batch</u>	<u>56 Day Compressive Strength (psi)</u>
No. 1 - Control	7430
No. 2 - with MBL-82	7570
No. 3 - with Xypex	8340
No. 4 - with MBL-82 and Xypex	7990

This completes the work you requested. Please contact me if you have any questions.

We have enjoyed working with you and look forward to doing so again soon.

Sincerely,

KLEINFELDER, INC.


Clifford N. Craig, C.E.
Operations Manager

CNC/tb62-47

Xypex Chemical Corp.
Concrete Trial Batch Testing

File No.: 11-4254-01
Date: October 30, 1992
Lab No.: 3202

CONCRETE LABORATORY TRIAL BATCH NO. 1
Central Concrete Mix No. 2773 Batched by Kleinfelder

MATERIALS

QUANTITIES (LBS.)

		<u>Design-SSD(pcy)</u>	<u>Batched (3.0 cf)</u>
Cement	(Lonestar Type II)	620	68.9
Fly Ash	(Pozzolanic International)	109	12.1
Coarse Aggregates	(Mountain View) 1" x No. 4	1750	197.1 (1.4% free moist)
Fine Aggregates	(Olympia Felton)	1264	145.8 (3.9% free moist)
Water		275	28.1
Admixtures	MBL-82	<u>6 fl.oz./cwt</u>	<u>0 cc</u>
Total Weight		4018	452.0

TRIAL MIX RESULTS - ASTM C94
(3.0 cu.ft. Batched 9-29-92)

Slump	3-3/4"	Design Water Demand	275 pcy
Air Content (vol.)	1.2%	Design Water Cementitious Ratio	0.38
Air Temperature	80°F	Batched Water Content	326 lbs (pcy)
Mix Temperature	78°F	Batched Water Cementitious Ratio	0.45
Fresh Unit Weight	149.3 pcf	Relative Yield	1.01

COMPRESSIVE STRENGTH
(psi) - ASTM C-39
6x12 Cyls - Moist Cured

TIME OF SETTING OF CONCRETE
ASTM C403

Age:	<u>1 Day</u>	<u>3 Days</u>	<u>7 Days</u>	<u>28 Days*</u>	<u>Time</u> <u>(min.)</u>	<u>Penetration</u> <u>Resistance (psi)</u>
	1780	3100	4730	6600	240	290
				6330	300	1113
					360	4780
Avg:				6460		

Initial Setting @ 500 psi = 260 min. (4.3 hrs)
Final Setting @ 4000 psi = 360 min. (6.0 hrs.)

Notes: *56 Day tests to be reported later when test complete

Xypex Chemical Corp.
Concrete Trial Batch Testing

File No.: 11-4254-01
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CONCRETE LABORATORY TRIAL BATCH NO. 3
Central Concrete Mix No. 2773 Batched by Kleinfelder

<u>MATERIALS</u>		<u>Design-SSD(pcy)</u>	<u>Batched (3.0 cf)</u>
Cement	(Lonestar Type II)	620	68.9
Fly Ash	(Pozzolanic International)	109	12.1
Coarse Aggregates	(Mountain View) 1" x No. 4	1750	197.1 (1.4% free moist)
Fine Aggregates	(Olympia Felton)	1264	145.8 (3.9% free moist)
Water		275	26.2
Admixtures	MBL-82	6 fl.oz./cwt	0 cc
	Xypex (2% cement wt.)	<u>12.4</u>	<u>1.38</u> lbs
Total Weight		4018	451.5

TRIAL MIX RESULTS - ASTM C94
(3.0 cu.ft. Batched 9-30-92)

Slump	3-1/2"	Design Water Demand	275	pcy
Air Content (vol.)	2.0%	Design Water Cementitious Ratio	0.38	
Air Temperature	72°F	Batched Water Content	309	lbs (pcy)
Mix Temperature	78°F	Batched Water Cementitious Ratio	0.42	
Fresh Unit Weight	---	Relative Yield	---	

COMPRESSIVE STRENGTH
(psi) - ASTM C39
6x12 Cyls - Moist Cured

TIME OF SETTING OF CONCRETE
ASTM C403

Age:	<u>1 Day</u>	<u>3 Days</u>	<u>7 Days</u>	<u>28 Days*</u>	<u>Time</u> (min.)	<u>Penetration</u> <u>Resistance (psi)</u>
	1870	3860	5350	7060	240	9
				7250	300	19
					360	75
Avg:				7160	420	371
					460	960
					490	2015
					520	3940
					540	5310

Initial Setting @ 500 psi = 430 min. (7.2 hrs.)
Final Setting @ 4000 psi = 525 min. (8.8 hrs.)

Notes: *56 Day tests to be reported later when test complete